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SOME REMARKS ON LABYRINTHINE SURGERY.

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Perhaps no subject in otology is more under discussion and more unsettled than the one upon which I am about to speak to you.

When surgical invasion of the labyrinth was first brought to our notice all operators were most enthusiastic upon the subject and complete extirpation of the labyrinth was very freely practiced, not only abroad, but also in this country. With the passage of time, however, I believe that all otologists have assumed a more conservative attitude in attacking the labyrinth, and in my opinion this conservatism has been wise.

Cases of labyrinthine invasion by a pathological process may be divided into those in which the invasion of the labyrinth by a suppurative process occurs, as follows: First, cases where the invasion of the labyrinth is so insidious that it produces slight or no symptoms. Under this classification belong those cases in which erosion, slight in degree, occurs in one of the semicircular canals, usually the horizontal. These cases present a history of a chronic middle ear suppuration with, in certain instances, ill defined headache and vertigo. Quite frequently, the invasion of the labyrinth is so insidious and the progress is so slow that no symptoms occur and we find at the time of a radical operation an eroded area in one of the semicircular canals. As before stated, this erosion almost always occurs in the horizontal semicircular canal, so I shall not again repeat this statement and shall assume the horizontal canal is the one attacked unless I mention otherwise in the progress of the paper.

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The next class of cases is those in which the invasion of the labyrinth occurs rapidly and is accompanied by well defined headache and vertigo, that is acute suppurative labyrinthitis. In still another class of cases we have following operative procedure upon the middle ear, and the procedure is usually the radical operation, labyrinthine symptoms characterized by considerable vertigo, nausea, vomiting, nystagmus to both sides and an elevation of temperature of two or three degrees. These cases I regard as a serous labyrinthitis, secondary to the middle ear suppuration and probably caused by the operative procedure. One case of this kind I remember particularly. A girl about ten years of age suffering from a chronic middle ear suppuration. A radical operation was performed with the use of the primary skin graft. In this case the labyrinth was active at the time of operation. Within forty-eight hours after the operation the temperature rose to about 102° the child was very dizzy, vomited, had nystagmus to both sides, and the spinal fluid was normal. The procedure consisted in immediately removing the primary skin graft and Dakinizing the entire cavity. The temperature fell in the course of forty-eight hours after this procedure, and the child made an uninterrupted recovery, although she remained absolutely deaf. This was a case of serous labyrinthitis following a radical operation.

The third class of cases with which we have to deal are those in which the invasion of the labyrinth is simply the first stage of an attack upon the intracranial structures represented either by an infection of the meninges leading to diffuse meningitis or to an involvement of the brain substance itself resulting in a cerebellar abscess.

The surgical procedures indicated in these various conditions are naturally varied, and in presenting this subject for your consideration I am simply going to present to you my personal experience. While the experience of no one man in this branch can be large, I hope that what I may have to say may not be entirely worthless.

Taking the first class of cases mentioned, that is, a fistula in the horizontal semicircular canal, discovered at the time of radical operation, which has presented no symptoms, or in cases where we have a dead labyrinth with no symptoms, it has been my practice to let the labyrinth severely alone. I ordinarily do the ordinary radical operation and in the absence of a labyrinthine fistula do not hesitate to graft the cavity primarily even although the caloric reaction may have been entirely absent prior to operation. If there is a fistula in the horizontal canal I never probe the fistula, although

I did do this formerly without any untoward results. My practice is to curette gently the margins of the fistula and remove all carious bone, making every effort not to accidentally enter the canal and thereby liberate labyrinthine fluid. I have followed this procedure in numerous cases and have never seen an unfavorable result. Naturally, I would not do a complete primary grafting in a case of labyrinthine fistula. The usual meatal flap is made and then one packing is placed in the middle ear, a second over the labyrinthine fistula and a third in the posterior part of the cavity. From long habit I have used iodoform gauze in these cases, but I presume a sterile gauze would do equally as well. The packing from the middle ear and the posterior part of the cavity is removed at the end of forty-eight hours, while an attempt is made to leave the packing over the fistula undisturbed. Sometimes this is possible, sometimes not. If the packing over the fistula comes away with the other packing it should be replaced. In other words, the diseased area of the semicircular canal should be packed off separately for at least a week after the operation. It is understood that in these cases the posterior wound is closed in the usual manner. The presence of a fistula to my mind is no contraindication to the complete closure of the posterior wound. At the end of two weeks the cavity is then completely lined with a secondary graft. This procedure has been employed in numerous cases, and in no case have I seen any untoward result. To recapitulate, a dead labyrinth producing no symptoms, or a fistula in the horizontal semi-circular canal producing no symptoms is no indication for a complete labyrinthine extirpation.

When we come to cases of acute invasion of the labyrinth, those characterized by symptoms of severe vertigo, vomiting and nystagmus to the opposite side, our procedure must be quite different. In all of these cases with one exception and, that was a fatal case, it has been my practice to operate early upon the labyrinth, and to do a complete labyrinthine operation. Four cases of this character have come under my observation. In two of these cases a modified Hinsberg operation was done, that is the vestibule was entered through the horizontal semicircular canal. The canal was laid open widely and the cochlea was next drained by removing the ledge of bone between the oval and round windows. The curette was cautiously used until the lower and a part of the middle turn of the cochlea were removed. The probe could then be easily passed through the opening in the vestibule under the facial ridge, emerging through the cochlear opening. Two cases were drained in this

way, both patients recovered and are living at the present time, although the operations were performed over sixteen years ago. In a third case of rapid involvement of the labyrinth,—this case occurred several weeks after a radical operation and after the patient had been discharged from the hospital, the Neumann operation was done. Pus was found in the labyrinth. A complete recovery followed in this case. It is interesting to note that in this particular instance the cerebellar dura was accidentally torn and there was a slight hernia of the cerebellar substance. The opening in the dura was closed by fine sutures and the area packed off separately. Naturally I thought that this accidental opening of the dura with the presence of pus in the labyrinth would probably be followed by a fatal issue. Fortunately, however, this patient made a complete recovery.

In one case, and this was in the earlier years of labyrinthine surgery, the patient gave a history of what apparently was an acute labyrinthine invasion two and a half years before. When I first saw him two and a half years afterwards, the left labyrinth was dead, and complete facial paralysis was present. This had come on at the time of the acute invasion. In this case I did a complete labyrinthine operation by the modified Hinsberg method already described. I found that the entire labyrinth had become ossified and there was not a trace of any of the semi-circular canals. The vestibule was entered with great difficulty and drainage through the cochlea was established in the manner just mentioned. This patient made a complete recovery and the facial paralysis was entirely relieved, the facial being exposed at the time of the operation. Here I am convinced that interference with the labyrinth was unnecessary, and that a radical operation with free exposure of the facial nerve would have been successful. In a fourth case which was one apparently of a chronic serous labyrinthitis a large amount of serous fluid escaped from fistulae in the horizontal and superior semi-circular canals. The vestibule in this case was drained posteriorly and the cochlea left undisturbed. Here the ordinary radical operation was done. Naturally, no grafting was used in this case, and the patient made a complete recovery.

Quite different from this were two cases in which delay was fatal. One was that of a patient who, one month after a mastoid operation in which the infection had been pneumococcus Type 3, suddenly became dizzy and was readmitted to the hospital. He had no temperature, a dead labyrinth, nystagmus to the opposite side, his spinal puncture showed normal spinal fluid, and roughened bone could be felt in the aditus. The history of this case, however, had

been short and there had been no evidence of any erosion in the horizontal semicircular canal, at the time of the original operation. Here I felt that I might have to deal with a simple serous labyrinthitis, and knowing the gravity of the infection, I rather hesitated to do a radical labyrinthine operation in the absence of temperature, owing to the fact that the patient's symptoms were gradually disappearing, and because the spinal fluid was normal. The case was discussed, particularly with the laboratory men, and all felt that there was a certain amount of danger of liberating an infection which might become walled off subsequently, while immediate operation might be followed by an acute meningitis. The subsequent progress of the case proved that we were all absolutely wrong. The man suddenly developed symptoms of acute meningitis, and although a prompt labyrinthine extirpation was performed, the patient died shortly after the operation.

In doubtful cases where the labyrinth gives no reaction to the caloric test the operator should always perform the radical operation even in the presence of a comparatively acute history. In one case with spontaneous nystagmus, no vertigo and a dead labyrinth, with an indefinite history, all symptoms pointing to an acute condition, and with a fundus so contracted that a negative caloric I thought might be disregarded, a simple mastoid operation was done. The horizontal semicircular canal was exposed as much as possible in this operation and no fistula was found. Twenty-four hours after there was a moderate rise in temperature with headache and a cloudy cerebrospinal fluid. Through a misunderstanding in my directions an immediate labyrinthine operation was not done, and this patient died of meningitis. This and the other fatal case impressed upon my mind the absolute necessity of determining absolutely the condition of the horizontal canal in every doubtful case when the caloric reaction is negative. This can only be done by a radical operation. While we may err in doing an operation unnecessarily extensive, the saving of a life in a doubtful case renders the procedure absolutely justifiable. In one instance in which a fistula was found in the horizontal semicircular canal in which the labyrinth was active, the fistula was enlarged and the vestibule entered through the horizontal semicircular canal. The cochlea was not opened as the labyrinth had been active and there was some hearing in the affected ear. In this instance the labyrinthine fistula was packed with iodoform gauze and the remainder of the cavity was grafted with a primary graft. This patient recovered, so that apparently the grafting about the fistula had no untoward effect.

Occasionally during the process of a radical operation the stapes may be accidentally removed. This, naturally, opens an avenue of labyrinthine infection and considerable discussion has occurred as to the proper procedure to be followed in cases of this character. The accident has happened to me several times, perhaps a half a dozen, certainly not more than this in over six hundred radical operations. In one instance having a very clean field I disregarded the accidental opening of the oval window and inserted the primary graft. This patient died of meningitis. The procedure was an unwise one and has never been repeated. Since then it has been my practice to pack off the oval window with a strip of iodoform gauze, form the meatal flap, and close the posterior wound in the usual way. Two weeks later these cases have been grafted secondarily without any fatality. This seems to me the proper procedure in these cases.

In a number of cases we find more or less extensive necrosis of the labyrinth. This is met with in cases of long standing middle ear suppuration. In one case in particular which I remember, both ears were the seat of a very foul discharge. A sequestrum which on one side included the entire labyrinth, and on the other side almost the entire labyrinth was removed. On one side the patient had a facial paralysis prior to the operation. This patient made a complete recovery and the facial paralysis almost entirely disappeared. Unfortunately, I have been unable to find my records of a number of cases of necrosis of the labyrinth which I have seen. I remember this double one well, and I have seen one or two others in which partial sequestra have been removed. As I remember no fatality has ever attended a case of this kind at my hands.

We now come to a class of cases where the labyrinthine operation is employed as a primary measure for the surgical relief of meningitis. In other words, if the patient has symptoms of meningitis, and we have a suppurating ear and a dead labyrinth, we hope by a prompt operation to eliminate the primary focus of infection so early that the meningitis may remain localized. In these cases it has been my practice to do the Neumann operation with free exposure of the area triangularis as far as the internal auditory meatus, to incise the dura in this region, and to drain the subdural space by means of a rubber tissue drain. In a few instances an attempt has been made to wash out the subdural space through the opening in the dura through a needle inserted into the cisterna sub-occipitally.

All cases in which the labyrinth has been operated upon in the hope of curing an otitic meningitis have been fatal with the exception of one. This case was operated upon by the late Dr. Charles E. Perkins. In addition to draining through the area triangularis a large subtemporal decompression was done. There was a large cerebral hernia. The entire wound was Dakinized for a number of days. Although this patient had all the symptoms of meningitis with rigidity, headache, temperature, etc., he finally recovered. Unfortunately, a subdural fistula appeared, in other words, cerebrospinal fluid discharged from the ear in small amounts continuously. The patient was urged to have a second operation for the closure of this fistula. He refused, however, and died six months later from meningitis, having been perfectly well for the previous six months and being able to attend to his duties.

Summing up, therefore, I have to record twenty cases of labyrinthine invasion in which the records are fairly complete. Seven were cured, and thirteen died. In all of the thirteen fatal cases, meningitis was present at the time of the labyrinthine operation, and the labyrinthine operation was simply undertaken to drain the subdural space through the area triangularis.

In think we may say as a result of this analysis of cases, that as the seven cures were cases of uncomplicated labyrinthitis that prompt operative interference at the occurrence of acute labyrinthine symptoms offers an excellent prospect of recovery, but that delay in the presence of labyrinthine symptoms is bad surgery.

A dead labyrinth without symptoms need not necessarily be removed. In fact, in the absence of symptoms it is inadvisable to interfere with the labyrinth. The presence of a labyrinthine fistula which gives rise to no symptoms and is only recognized at the time of a radical operation is no indication for a labyrinthine extirpation, but should be treated in the manner before described. Accidental opening of the oval window is not necessarily followed by meningitis, and if the oval window is packed off at the time of operation meningitis will probably not follow. The removal of the labyrinth in cases of meningitis has, in my hands at least, proved extremely unsatisfactory, and while in the absence of any better procedure at present we shall probably all perform the operation, I cannot say from my own experience that it has been of material benefit.

GASTRO-INTESTINAL DISTURBANCES IN INFANTS AS A RESULT OF OBSCURE INFECTION IN THE MASTOID.* **

DR. ARTHUR M. ALDEN and DR. HARRY W. LYMAN, St. Louis.

The co-existence in the same baby of severe gastro-intestinal disturbance and otitis media has been noted for many years by both pediatricians and otologists.

The first, however, to suggest a causal relationship between the two was Hartmann¹ who, in 1898, mentions the fact that digestive disturbances, diarrhea and progressive loss of weight in infants, may be brought about by infection in the ears. He also found that drainage of these infected ears by paracentesis favorably affected the gastro-intestinal syndrome and suggests that all infants with intestinal disease and progressive loss of weight should have the ears carefully examined for possible otitis media. Preysing² in 1904, stated that he believed that the severe intestinal disturbance in such cases was due to toxic substances which had found their way into the blood or lymph currents owing to rapid absorption from the middle ear empyema. In 1921, Maurice Renaud³ made the following statement:

"During the months of August and September, 1921, the middle ear and mastoid antra were examined in seventy consecutive autopsies on infants that had died from atresia and infantile diarrhea. In all of them extensive suppuration in the middle ear and mastoid antra was found. Thirty cases had been diagnosed as otitis media during life. The forty others had been overlooked. The final diagnosis in most of the cases was infantile diarrhea.

"The clinical course of all of these infants was that of progressive atresia with vomiting, diarrhea, final cachexia and death.

"The pathological findings in these cases, was far as the digestive tract went, were generally negative except in certain cases for hyperplasia of the lymphoid tissue. Pus infection of the middle ear and mastoid antra was found in all the cases. In four-fifths of the cases the lesions were bilateral. The ear drums were usually thickened and red, though in many of the cases they appeared

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normal. There was not only inflammation of the mucous membrane but a true osteomyelitis of the petrous portion of the temporal bone. The internal ear showed infection in a small number of the cases.

"As a result of these post-mortem examinations and in an attempt to save some of these babies, post-auricular drainage was done in ten cases of athrepsia in extremis. Nine died. One made a splendid recovery. The high percentage of mortality was attributed to the fact that the operation was done too late and when the baby was in desperate condition. After this treatment the ears of all these patients showed at least temporary improvement."

His conclusions were as follows: "Nurslings become cachetic because they are suffering from infection, not because of heredity or dyspepsia."

"Ears must always be examined, and antrotomy done if there is no improvement after a few days of conservative treatment. The diet question becomes secondary to the presence of infection."

That children often show marked constitutional disturbances, usually of gastro-intestinal type, which are the result of infection in the mastoid, without the usual symptoms of mastoiditis, is well known. McDougal and Knauer⁴, in 1923, reported five cases of mastoiditis in children, in which the principal symptoms were extreme prostration, progressive emaciation and lethargy without any of the classic signs of mastoid infection being present. Of these children, three died and autopsies demonstrated extensive pathology in the middle ear and mastoid, which was due in each case to the streptococcus. The two children who lived were those in which early bilateral drainage of the mastoid was done.

Byfield⁵ also calls attention to gastro-intestinal symptoms in children which are the direct result of obscure infection in the middle ear or mastoid. Floyd⁶ reports a series of twenty-six babies with mastoid infection which came under his observation. The most marked symptoms were severe and sudden gastro-intestinal disturbance, rapid dehydration with pronounced loss in weight, extreme toxicity and, in a few of them, death within a short time from the onset of the disease. His conclusion is as follows: "Bilateral mastoidectomy performed as soon as the condition is determined and other foci eliminated has resulted in prompt recovery of many of these infants and is probably the only means of saving the child's life.

Marriott⁷ summarizes the pediatric aspect of this syndrome in the following statement:

"It is now pretty well recognized that the acute nutritional disturbances of infants associated with fever, diarrhea, hydrolability and toxic symptoms are not the result of a food or alimentary intoxication in the sense that some particular element of the food is at fault. With intestinal infections and food poisoning ruled out as factors, we are forced to conclude that there must be some general metabolic disturbance or a toxemia of infectious nature. The fact that these infants have fever and leucocytosis which at times is greater than can well be explained on the basis of anhydremia alone suggests the possibility of infection. Autopsies on these patients reveal no lesions in the gastro-intestinal tract and no infectious foci in locations usually examined. Two years ago we began making somewhat more complete autopsies on infants succumbing to nutritional disturbances. The mastoids were opened at autopsy and it was found that the mastoid antra were filled with purulent material containing hemolytic streptococci. This finding occurred in patients in whom the drum membrane had been widely opened some time previous to death, it being evident that this procedure had not been sufficient to insure drainage of the mastoid antrum.

"That the symptoms of these children, especially the hydrolability or gastro-intestinal symptoms, are the result of a specific intoxication rather than of fever in itself seems probable. Infants suffering from other types of infection with higher temperatures do not exhibit the same symptomatology. Even infants with mastoid infections due to other organisms such as the pneumococcus or staphylococcus do not exhibit these symptoms. It seems probable that the symptoms are the result of a streptococcus toxin and that this toxin acts by damaging the capillaries. The toxins of other streptococci, such as the scarlet fever streptococcus, act on the capillaries of the skin and of the renal glomeruli. In infants the gastro-intestinal tract is the seat of much greater activity than in older children and it seems that the toxin affects the capillaries more in this portion of the body than elsewhere at times, and occurs as an association to the capillary changes. The capillaries of the skin surface are definitely constricted in these infants and abnormal in shape. Laying aside the theory of the possible mechanism of these infections in bringing about the symptoms the fact remains that such infections are constantly associated with the condition under discussion and that the most hopeful method we have yet found consists in dealing promptly with the infections."

Our work on this group of cases was begun about two years ago at the suggestion of Dr. W. McKim Marriott, the Director of the

St. Louis Children's Hospital. What success we have had in the treatment of these babies has been due in a large measure to his helpful counsel and the splendid co-operation which we have received from the entire pediatric staff of the hospital.

At first we were somewhat reluctant to accept this new idea of infection in the mastoid of infants being responsible for alimentary symptoms, but autopsy protocols of several of the babies who died convinced us that in many cases we had overlooked this obscure type of infection. More frequent and more careful examinations of the ears of these babies with the electric otoscope demonstrated the fact that infection in the mastoid antrum of a baby is not entirely without otologic signs.

Examination of the ears of these infants rarely shows the conventional signs of acute suppuration in either the middle ear or mastoid and in none of these cases were any of the external signs of mastoiditis present. The ear drums may be dull and gray or may show slight reddening and may or may not be bulging. However, there is always some change in their color, the normal lustre having given place usually to a dirty gray, opaque appearance. The one finding that is most constantly present is a distinct sag of the superior or posterior superior wall of the auditory canal just external to the tympanic membrane. With the use of a head mirror and reflected light this sign may easily be overlooked, but if the ears are carefully examined with the electric otoscope and brilliant illumination this phenomenon can usually be found.

In infants there are two anatomical factors which help to make this particular symptom of more than ordinary significance. At birth, the antrum, attic and upper portion of the middle ear are filled with soft mesodermal tissue, which, as the child grows, becomes gradually absorbed and thinned out. But in early child life there is so much of this embryonic mucosa remaining in the attic and antrum that it requires only the slightest irritation in this region to cause swelling enough to entirely separate these cavities from the middle ear. This is the reason why suppuration in an infant's mastoid antrum cannot be adequately drained by the ordinary incision through the tympanic membrane.

The second anatomical consideration which has a definite bearing upon this condition is the fact that in infants the tympanic annulus in its superior portion is incomplete. Therefore any accumulation of fluid in the antrum will show as a bulge downward of the membranous floor of the antrum or upper wall of the external auditory

canal. An incision in order to drain these accumulations must include not only the upper portion of the tympanic membrane, but this membranous floor of the mastoid antrum as well.

With this fact in mind, repeated incisions in the upper part of the tympanic membrane and floor of the antrum were made in several of the cases, often followed by a temporary drop in the temperature and slight improvement in the general condition. However, in the majority of the babies the diarrhea, vomiting and general drying out continued until more adequate drainage was established by way of the mastoid.

The surgical drainage of infected mastoid antra in infants is not a formidable procedure. In all of our cases except one it has been carried out under local anesthesia. For this purpose $\frac{1}{2}$ per cent novocain with 8 drops of adrenalin to the ounce is used. The skin along the line of incision and the periosteum over the upper portion of the mastoid is thoroughly infiltrated. The incision required is usually only about 2 cm in length. After the periosteum, behind and above the superior bony wall of the external auditory canal, has been elevated, a round button of bone is taken out with two strokes of an 8 mm. Alexander gouge. This usually completely uncovers the posterior end of the mastoid antrum. In infants, this consists usually of a single cell varying in size from 6 to 10 mm. in diameter. Careful curettage of all granulations from this cell is done without any attempt being made to pass the curette into the attic. In other words, the mucous membrane of the aditus ad antrum is left undisturbed. A small drain is placed in the cell and no attempt at surgical closure of the incision made.

The post-operative care of these cases consists simply in changing the drain and wiping out the mastoid cavity with a solution of mercuriochrome until the middle ear has become entirely dry. The drain is then withdrawn and the wound allowed to close, which it does very rapidly.

The diagnosis of this syndrome must rest for the most part upon pediatric considerations. The diarrhea, vomiting, progressive loss of weight and consequent anhydremia are all definitely outside the realm of the otologist. This picture should, however, suggest to the pediatrician the possibility of a streptococcus infection in the ears, and in the diagnosis and treatment of this phase of the condition alone is the otologist concerned.

The treatment of the case with the exception of the operation and simple surgical dressings should be carried out by the pediatrician. This consists for the most part in supportive therapy coupled with

replacement of the lost fluids until the hydrolability is corrected. Upon the success of these measures the outcome of the case depends, for unless the weight can be kept up until the infection has been eliminated and some resistance established, disaster is sure to follow.

Up to date, we have operated upon fifteen babies with athrepsia. These children were between two and fourteen months old, the majority between three and seven months. Of this group, eight recovered and seven died. The average of the ages of the children that recovered was eight and three-eighths months, that of the fatalities three and five-sevenths months. From this it would appear that the older the child the better the chance for recovery. None of the deaths could be attributed to the operation or to post-operative shock, despite the fact that several of the babies were "in extremis" when operated upon. Even those that finally succumbed showed distinct temporary improvement following operation.

Cultures taken at the time of operation showed hemolytic streptococcus in eleven of the cases, pneumococcus in one and three of the cultures were lost or contaminated so that a report was not available.

In nine of our cases both ears were involved, while six showed pathology on one side only.

In the light of our present knowledge of this condition we feel that several of the fatalities, especially in the early part of our work, could perhaps have been avoided had they been operated upon as soon as the diagnosis was established instead of temporizing with the use of more conservative measures. Inasmuch as heretofore the mortality rate in this condition has been practically 100 per cent, the fact that we have been able to save more than 50 per cent of our cases seems to demonstrate conclusively the value of this form of treatment.

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FURTHER OBSERVATIONS CONCERNING THE NATURE OF NUTRITIONAL DISTURB- ANCES. (Author's Abstract.)*

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Nutritional disturbances due to dietary faults are now fairly well understood and may be satisfactorily treated. Such disturbances are usually the result of diets deficient either quantitatively or qualitatively. The theory of food or alimentary "intoxication" fails in many particulars to provide a satisfactory explanation for the disturbances. That enteral and parenteral infection may result in nutritional disturbances has been recognized for many years. The purpose of this paper is to point out the apparent etiological relationship between infections of a special type and the severe nutritional disturbances characterized by severe watery diarrhea, prostration, rapid loss of weight, failure to retain fluid, even when given in large amounts, a gray color of the skin and acidosis.

Complete autopsies on a number of infants suffering from this type of disturbance revealed streptococcus infections of the mastoid antrum. Similar observations have been made by Renaud,¹ Byfield,² and Floyd.³ In a group of twenty infants suffering from the symptoms described mastoid antra were opened under local anesthesia and streptococcus pus obtained. The operation itself caused very little disturbance. In a large proportion of the cases there was almost immediate relief of the symptoms. The usual local signs of mastoid involvement, such as swelling, redness and tenderness, were absent. The tympanic membrane showed some change; in all cases there was consistently a sagging of the posterior superior wall of the canal near the junction with the tympanic membrane. It is possible that a mastoid antrum infection can clear up without operation, but in many young infants there is excessive folding of the embryonic mucosa in the attic, which in the presence of infection swells so as to completely close off the attic and antrum. In other instances the *aditus ad antrum* is so narrow at its posterior end that adequate drainage is not possible. In this way infections remain active in the mastoid antrum despite free paracentesis.

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Infections of the mastoid antrum with other organisms than the streptococcus do not give rise to the same general symptoms and it is suggested that the streptococcus toxin exerts a specific action on the capillaries of the body in general and of the intestinal tract in particular, which results in the hydrolability which is so characteristic.

The most successful dietary treatment has been a caloric diet of undiluted lactic acid milk with the addition of fair amounts of corn syrup. Any considerable restriction of the diet is to be avoided.

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A DISCUSSION OF SOME OF THE CLINICAL PROBLEMS OF CHRONIC SUPPURATIVE OTITIS MEDIA.

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When I undertook to select a subject that would be suitable for my discussion this evening I asked myself what would interest me if I had an opportunity of listening to some of the men here present discuss otology and the thought occurred to me at once that I would be very much interested in hearing you discuss some of the every-day problems. It is always interesting to hear what crystallized conclusions one has reached regarding every-day problems after a decade or two of practice in otology. I confess in the beginning that I have nothing new to offer and that I appreciate that I do not know nearly as much about the subject of chronic otorrhea as do some of you.

One phase of this subject I should like to discuss briefly; that is the relationship that may exist between chronic otorrhea and disease of the nose and throat. That a relationship exists is, of course, well-known but that this relationship is often over-exaggerated I am fully satisfied. The most important relationship is that we get infection into the middle ear from nose and throat infection. Another is that tubo-tympanic conditions develop from growths in the nasopharynx of which, of course, adenoids are the most common, but any new growth is likely to have as one of its earliest symptoms evidences of tubal occlusion. Another relationship in which we have become interested in recent years is that between

latent infection in the nose and throat and such degenerative processes in the ear as chronic progressive nerve deafness. The relationship here is not one of contiguity and infections from any other part of the body might be expected just as readily to produce the degenerative processes in the auditory nerve as would diseases of the sinuses or tonsils. I suspect, however, that we are as much inclined to over-estimate as to under-estimate the importance of this relationship. Systemic infection from tonsils has been vastly over-estimated, although we are all satisfied that an important relationship between the two does exist.

My reason for discussing this phase of otology is because I am satisfied that there is a great deal of misunderstanding regarding relationships which may exist between such things as anatomical variations in the nose and defective hearing. The nose has always been a prolific field for enthusiastic fads for such, in my opinion, is the assumed relationship between anatomical variations in the nose and ear trouble. You will find in the literature fine spun discussions about the irregularities of the septum which by producing abnormal air currents in the nasopharynx produce middle ear trouble. The careful observation of cases will, I think, satisfy any fair-minded person that such relationship is entirely imaginary. Look, for example, at the condition of cases of congenital atresia of the choanae of one or both sides. If the alterations in the nose referred to above were capable of producing middle ear trouble then we would expect to find cases of atresia unusually prone to tubal conditions. I have seen four of these cases and in not a one was there the slightest evidence of any middle ear trouble. The condition in the nose that is most frequently subjected to operative interference for the relief of ear trouble is irregularities of the nasal septum. My own conviction is that no relationship whatever exists between such irregularities and the development of any form of ear trouble. Let us take up now some of the clinical problems of chronic suppurative otitis media. We are all in these days alert to the menace that exists in chronic suppurative otitis media. However, a running ear was not always regarded as a menace and the idea was formerly rather widespread that a chronic running ear had better be left alone, that if anything was done to stop the discharge it would only lead to the development of some more serious complication. This idea may have originated from the clinical observation quite familiar to all of you, that a profusely discharging ear may suddenly cease or the discharge become greatly diminished and it is not until 24 or 48 hours that symptoms develop of some

complication as, for example, the swelling in the neck or intracranial disease. The sequence is now well-known. The perforation of the mastoid abscess takes place, the pus brought in contact with these soft tissues is absorbed and it is not until some little time has elapsed that other evidences of the perforation, such as a swelling in the neck, meningitis, etc., has time to develop. As a matter of fact, an appreciation of the real menace from chronic suppurative otitis media became recognized only after the custom of holding post-mortems became general when it was discovered that many patients died of complications, such as meningitis, brain abscess, sinus thrombosis, in which the ear had not been suspected.

When examining recruits during the first period of the war I became impressed over and over again with the fact that a patient may have a chronic running ear that actually constitutes a serious menace and may still be quite unaware of the fact that the ear was discharging. The full recognition of the menace that exists in chronic suppurative otitis media gave to the otologists a very definite problem, that of clearing up the infectious focus. Many methods of local treatment were tried out; often ears that had discharged from thirty or forty years were cured after only a few proper local treatments. It was found, however, that while local treatments cleared up a certain number of these cases, there were others that would not clear up by local treatment of any sort. Efforts were naturally undertaken to eradicate the process surgically, some believing that the fault lay in impaired drainage advocated ossiculectomy and this operation for a time had quite a vogue until it became apparent that very few cases of ear disease cleared up after ossiculectomy, which would not also clear up under properly directed local treatment.

Working with the same idea in establishing better drainage, efforts were made to cure the chronic discharging middle ear disease by following out the typical Schwartz operation of draining the antrum. Schwartz himself for a time operated on many of these cases with the intention of leaving the antrum open as long as possible, placing a metal tube from the antrum through the aditus. This method also proved as disappointing as ossiculectomy, for the simple reason that these intractable cases of chronic focus of infection, a bone invading disease exists somewhere in the passage from the tympanum to the antrum, which focus could not be eradicated except by surgical measures. This conclusion naturally led to the development of the radical mastoid operation in which these upper chambers, the attic, aditus and antrum, are thoroughly exposed and the focus of infection eradicated.

For a long time quite a controversy went on between those who advocated the radical mastoid operation for all cases of chronic suppurative otitis media and those who limited its application to the exceptional case, and this conclusion was for a considerable period accepted, that where local measures properly carried out over a reasonable period of time fail to cure a suppurative otitis media, there the radical operative interference was indicated. How long this period of local treatment should be carried out, varied from a few weeks to a few months.

I would state that this view is not the one otologists hold today and one of the chief advances that modern otology has achieved is the more accurate selection of the cases where the radical mastoid operation is really indicated. The situation can be stated in simple terms as follows: There exist, broadly speaking, two types of chronic otitis media, one in which there are elements of danger and the other in which elements of danger are practically absent. In the first there is a bone invading process and in the other the disease is restricted to the mucous membranes lining the middle ear chambers.

The problem then is one, in the first place, of differentiating between the simple and the bone invading process. It is only the latter where a radical operative interference is called for and in not all of these cases. This clinical differentiation is one which an experienced otologist can make with very little difficulty, often after a single examination and certainly after a few weeks of observation.

I shall point out some of the more significant clinical differences first, as regards the discharge. The amount of discharge plays an unimportant part since the most dangerous forms of chronic otitis media are those where the patient is not aware that he has any discharge. A profuse discharge, of course, means a more active process but it is not a help in differentiating between the simple and the bone invading process. The character of the discharge is of considerable importance. A mucous discharge or one that is more mucous than purulent is rarely found in bone invading disease except at periods when such a chronic disease becomes complicated by an acute exacerbation. In the bone invading process, granular sediment or cholesteatomatous material points to a more serious type. The clinical significance of the odor is of considerable importance. A bone invading disease is liable to be associated with a very offensive odor quite different from the odor that may be present in an ear where cleansing treatment has been neglected. In the latter case, the odor usually disappears after a few cleansing

treatments. In a true bone invading process, deep-seated caries or cholesteatoma, no amount of cleansing is capable of clearing up the bad smell.

The careful examination of the drum membrane gives us some very important clues in the diagnosis we are aiming to secure. The size of the perforation is of no special significance. What is of importance is the question as to whether the perforation has destroyed only the membrana tympani or whether it has also extended to and involved the bony margin. The latter always means a bone invading disease. Sometimes this is circumscribed to the bony margin itself and it should be kept in mind that in all cases where there is caries in the recessus epitympanicus or a cholesteatoma, a marginal perforation exists. The marginal perforation seems to be essential with very few exceptions for the development of a cholesteatoma, which it is well-known is the most dangerous type of chronic otitis media. A perforation in Shrapnell's membrane is very prone to lead to an invasion of the epidermis into the chamber of the attic and the formation of cholesteatoma.

Persistent, unilateral headache, when restricted to the side on which there is a chronic running ear, is rightfully looked upon as a possible indication of threatened intracranial complication, but where this headache is found in a patient where the running ear is of the simple type, it is highly improbable that the headache has anything to do with the ear trouble. I have several times seen cases of this sort where because of the chronic running ear the physician in charge, in spite of our advice that the type of ear trouble rarely if ever resulted in any condition capable of producing headache, insisted on carrying out an operation, and I have seen these cases months and months after the operation complaining of the same headache.

One of the practical problems that the otologist meets with is the question of what course to take in a patient who has a bilateral otitis media in which the radical mastoid operation is indicated. I have come to the conclusion that it is not a proper procedure to operate on both ears at once because no one has yet discovered a method by which he can be sure that the radical mastoid operation may not result in a rather serious increase in the impairment of hearing. Where the patient has a bilateral process in which the operation is indicated or where this operation is indicated in an ear that is the one on which he relies for hearing, one should consider the situation very carefully before subjecting such patients to operative interference. Only recently I saw just such a situ-

tion—a child 9 years old, who had had bilateral otitis media since the age of 3, had a radical mastoid operation on both ears, with the result that while he heard fairly well before the operation, he was left a practically deafened child after the operation. The proper procedure under such circumstances is to operate on the ear which is least useful in hearing and observe results. If there is little difference between the hearing on the two sides after this operation has been successfully carried out, then one is justified in operating on the other side.

It is a very important thing to get into the minds of the younger men that we are not advising operation of chronic suppurative ears because there is a discharge. We are operating on some of these cases because in connection with this discharge we have recognized a focus somewhere in the attic, aditus or antrum, a bone invading process which seriously threatens the patient's life. The operation is undertaken to get rid of this focus. Whether the operation results in a complete cessation of discharge is another matter. If the radical mastoid has as an end result the eradication of the focus of infection the object for which the operation was undertaken has been attained and it is of very little significance whether there is some moisture coming from the tube or tympanum. It seems to me a great deal of needless effort has been made to close the Eustachian tube. It is all very nice if the operation is successful in doing this, but if the operation is not successful, the physician should bear in mind that the object for which the operation was undertaken may nevertheless have been attained. A little discharge from the Eustachian tube is of no great significance.

I have time to say only a few words about one or two more of the clinical problems of chronic otitis media. First, about the labyrinthine complications: There are various types of labyrinth involvement. A not uncommon one is where a cholesteatomatous process erodes through the bony margin. This usually takes place in the floor of the aditus, erosion taking place into the horizontal canal. When the bone is once perforated the process rarely goes any further because the endosteum has resisting powers which the bone does not have. We speak of this as the circumscribed type of labyrinthitis. This process rarely results in a diffuse invasion of the labyrinth. Where an operation for the cure of the cholesteatoma seems clearly indicated, this should be carried out, avoiding disturbing the region of the fistula.

Diffuse invasion of the labyrinth from infection of the middle ear may be a serious menace because of the possibility of an intra-

cranial complication. We have been in the habit of speaking of two types of diffuse labyrinthitis—the serous and the purulent. In the former, there may be only a partial suppression of labyrinthine function, whereas in the latter a complete destruction is inevitable, but we have diffuse labyrinthitis which produces a temporary, complete suppression of function, but from which partial recovery may take place. In our text-books we have attempted to make too sharp a differentiation between the serous labyrinthitis and the purulent. All grades of inflammatory processes exist, from the mild serous to the destructive purulent process, exactly as we see taking place in otitis media, the simple serous catarrh and the mucopurulent and finally to the distinctly purulent disease, nor is it always easy to determine from our clinical examination which one of these labyrinth disturbances is the more likely. Naturally, where there is some vestige of function we can feel reasonably sure that the patient has a process which is very unlikely to result in a serious complication. On the other hand, we are not able to say that because there is a complete suppression of function, therefore the patient may not have a serous labyrinthitis from which he can make a partial recovery. About the safest guide that I have been able to follow has been this: Where there develops a diffuse labyrinthitis with a complete suppression of function, indications for operation upon the labyrinth are defined in two ways: first, if there are evidences of a threatened intracranial complication, headache, change in the cerebrospinal fluid, it is important that the operation for the extirpation of the labyrinth be carried out immediately. In the absence of such complications, the question of draining the labyrinth hinges entirely upon whether there exists independent of the labyrinth trouble indication for operation upon the mastoid. Where such an indication clearly exists then it is proper at the time of the operation also to drain the labyrinth.

HEMATOMA OF THE ANTRUM.

DR. MARTIN ROSS, New York.

Severe hemorrhage following trivial injury to the nose (either operative or otherwise) occurs with sufficient frequency to have been the experience of all rhinologists. Profuse hemorrhages resulting from surgery of the inferior turbinate and often of the middle turbinate, is likewise a common occurrence. Following the simple procedure of antrum irrigation, however, bleeding so alarming in nature as to threaten exsanguination, is distinctly an unexpected and rare complication.

M. F., female, age 26 years, came under observation at the New York Post-Graduate Hospital, complaining of symptoms warranting exploratory irrigation of the Antra of Highmore. Her past and family history were entirely negative.

The inferior meati were anesthetized by packing with cotton strips, saturated with 4 per cent cocaine, to which 6 drops of 1-1000 adrenalin to the ounce had been added. As a result, the inferior turbinates shrank considerably, so that despite the presence of a huge right nasal spur, the site of entrance into the sinus under the inferior turbinate was reached on both sides with no abrasion to either the turbinate, the septum, or the floor of the nose. A Douglas antrum trocar was used, and entrance into the maxillary antra negotiated without the slightest difficulty. The return flow of irrigating fluid being bloodless, patient was accordingly permitted to leave the hospital.

About half an hour later while enroute for home, the right side of nose suddenly began to bleed. The hemorrhage became so profuse that patient was rushed back to the hospital and admitted as an emergency case.

Upon admission patient was pale with a light degree of shock, blood literally pouring from the right side of her nose. Sanguinous tears coursed over her right cheek, as the blood found its way up the naso-lacrimal duct, and out through the punctum.

The point of origin of the bleeding could not be determined. Adrenalin applied to the lateral wall of the nose, under the inferior turbinate, was washed out without effect. The nose was packed tightly with gauze, but bleeding continued out through the mouth. A post-nasal plug was inserted and the right side of nose repacked. This partially controlled the situation but the patient's continual hawking loosened the plug with the resulting renewal of hemorrhage. The packing was, therefore, removed and a Bernay splint tucked beneath the inferior turbinate with very little benefit. Another "Bernay"

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placed tightly in the middle meatus soon controlled the situation. Evidently the bleeding had been coming from the middle meatus and not from the point of puncture. The splints were removed in thirty-six hours, with no return of bleeding. Transillumination of the antra at this time showed a marked clouding on the right side, similar previous examination having been negative. Patient was sent away for convalescence, returning in two weeks. During this time there had been no bleeding, patient's color gradually approaching the normal. Transillumination now showed some shadow on right side, but a marked improvement over the previous appearance. Four weeks later both antra transilluminated equally. No blood examinations were obtained, as patient, fearing further bleeding, refused to have this done.

Among the mass that has been written regarding accidents following antrum puncture, no mention has ever been made of the danger of hemorrhage. That this danger is remote, indeed, is attested to by its rarity, yet a review of the work of Gurlitz* leads one to wonder why this accident does not occur with greater frequency.

Gurlitz in an attempt to show the danger of air embolism following antrum puncture, observed in normal specimens, that the veins of the antral mucosa are very numerous. In 58 per cent of his specimens, he found a large plexus of veins either on the orbital or the nasal wall. The diseased antrum, with its thickened and polypoid mucous membrane, produces a venous plexus of much greater size.

A large number of deaths due to air embolism are caused by the injection of air directly into one of the veins described by Gurlitz. These veins when present, can easily be ruptured by the investigating trocar, and would make its appearance as brisk hemorrhage only after filling the antrum and spilling over through the normal osteum. This is what undoubtedly occurred in the case herein described, and explains the failure to check bleeding, until the region of the normal osteum was tightly packed.

It is a matter of conjecture as to whether or not a large percentage of cases showing a bloody return after irrigation by trocar puncture, is due to a wounding of the veins on the nasal wall of the sinus, rather than to an abrasion of the nasal mucosa beneath the inferior turbinate. Certain it is, that despite its infrequency, hemorrhage is a complication to be kept in mind, and together with the more frequent occurrence of air embolism, should lead one to regard the operation of antrum puncture with less contempt for its simplicity, and more respect for its possible dire sequellae.

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*Acta-Oto-Laryn., Stockholm, 1920-21, No. 25.

BACTERIAL CONSTANTS OF THE UPPER RESPIRATORY TRACT.

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An inquiry into the bacteriology of the upper respiratory tract must consider first, those organisms of endogenous origin wherein the offending agents find their habitat in the tissues of the individual as part of a normal flora; and the exogenous types wherein the bacteria are not already present, but are introduced from without under epidemic conditions through milk, contact, and droplet infection. Although the picture of the normal (endogenous) flora of the upper respiratory tract is not altogether constant, and is subject to individual, epidemic, and perhaps seasonal variations, late studies lead us to believe that the more common pathogenic organisms are present in more individuals and in higher numbers than was formerly suspected.

The scope of this paper will include only a brief consideration of the more important and constant bacteria of the pharynx and nasopharynx with special view to their occurrence, and to a lesser extent their cultural characteristics and pathogenicity.

The Hemolytic Streptococcus: There are numerous streptococci differing in many ways but alike in that they are able to hemolyze blood. We will consider only those affecting man and discovered normally in the upper human respiratory tract, especially in the deeper clefts and recesses of the tonsils and adenoids.

By "hemolytic streptococci" are meant those streptococci which on plain blood agar plates cause a wide clear zone of hemolysis about a small gray central colony. This zone is usually 2-4 m.m. across, but under varying conditions may be less or considerably more. Broth cultures of these streptococci when added to suspensions of red corpuscles will hemolyze in vitro, a test which is commonly used.¹

On the basis of their fermentative reactions Holman, in a satisfactory classification, recognizes eight different varieties, although some strains grouped together very markedly in pathogenicity and other qualities. Smith and Brown have suggested two classes, depending on the amount of hemolysis, an alpha type with a very narrow zone and a beta type with a wider, clearer area of hemolysis about the central colony.²

Formerly the reports on the frequency of streptococcus hemolyticus varied considerably, but it is now definitely established that practically all tonsils harbor them, especially in the crypt bottoms, in

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large and often predominating numbers. (Thus, Pilot and Davis, 1918, 97 per cent; Pilot and Pearlman, 1921, 95 per cent).

The lower figures obtained by most former investigators can be explained by the fact that they employed swabcultures of the tonsil surfaces and pharynx. Furthermore, the data obtained prior to 1903 and the use of the blood agar pour plate method is in accurate because the differentiation of viridans types from the hemolytic strains was not satisfactory.⁴

The tonsil crypts as the chief feeding focus of hemolytic streptococci for the throat and respiratory passages have been repeatedly emphasized by D. J. Davis. Furthermore, he states that this organism is never persistently present on normal nasal mucosa; normal gums and sound teeth do not harbor them in large numbers and they are not present on the skin of persons who bathe frequently.⁵ The gastrointestinal tract is normally free from them, but the adenoids, heretofore not considered a habitat, are now known to harbor hemolytic streptococci in large numbers and quite constantly in the slits and folds, which, though not as complicated, are quite analogous to the tonsil crypts and depressions.⁶

Although they have not been directly cultured it is not improbable that the tiny blind pits on the posterior pharyngeal wall are also sites where these organisms flourish. Considering the pathogenicity of the hemolytic streptococcus and ignoring the animal diseases due to this organism, man himself is quite susceptible and the list of diseases due to it is impressive, varying as it does from puerperal sepsis, endocarditis, erysipelas, pneumonias of a special type, as well as infections of the throat and nose. The organism has a marked ability to rapidly acquire increased virulence during epidemics, especially, and from playing an important role as secondary invader often becomes aggressive enough to become a primary agent. Particularly was this noticeable in the influenza epidemics of the recent past, as well as in the measles epidemics encountered in the military camps of the war period.

The Influenza Bacillus (Pfeiffer): Identification and morphology: The identification of the influenza bacillus may be considered fairly complete if in pure culture it has the following characteristics, *i. e.*, appearing as a small gram negative, nonmotile, polar staining bacillus growing on media containing hemoglobin, and demonstrating the property of symbiosis; *i. e.*, more profuse growth about a foreign colony.⁷

The organism may be grown on 10 per cent blood agar and especially on the so-called chocolate medium. This consists of infusion

agar to which defibrinated human blood is added in 5 per cent proportion and the whole heated at 90 for five minutes.¹⁸

On this brown chocolate medium the organisms grow freely as large, gray, flat colonies, whereas on ordinary blood agar the colonies are tiny, translucent and dew drop, with a strong tendency to grow around other colonies.

Microscopically the bacilli appear as small gram negative rods; some strains showing a uniform size. In others thread-like forms with considerable variation in individual size occur, while some are quite coccoid.

Influenza bacilli have often been recovered from the throats of normal individuals. The incidence reported varies rather markedly. In 1907, Davis reported their presence in 2 of 20 healthy individuals (10 per cent). Others more recently report them frequently in percentages varying roughly from 42 to 76 per cent,¹⁹ but these figures are based on cultures from saliva or swabs of the pharynx and nasopharynx.

From the extirpated tonsils and adenoids of 115 normal persons the bacilli were recovered in 40.9 per cent and 53.9 per cent respectively, and from nasopharyngeal swabs in 40 per cent.

The Incidence of Influenza Bacillus (Pfeiffer) in the Culture of Nasopharyngeal Swabs, Adenoids, and Tonsils.⁶

	Number of Persons	Percentage Positive
Series 1. Swabs	25	40.0
Adenoids	25	44.4
Tonsils	25	48.0
Series 2. Adenoids	90	38.8
Tonsils	90	55.5

Total number of adenoids from which cultures were made 115 40.9
 Total number of tonsils from which cultures were made 115 53.9
 crypts and adenoid folds, but in higher percentages than on the surface of these structures, which in healthy individuals must be considered foci in which influenza bacilli (Pfeiffer) flourish frequently.

That Pfeiffer's bacillus is the cause of influenza is still a moot question with perhaps the preponderance of evidence against this notion. There is no doubt that the influenza bacillus is pathogenic for man, it having been recovered in pure culture from cases of meningitis²² and the bronchopneumonia which often accompanies the former. Experimentally introduced under the skin suppurative lesions occur, and it will kill laboratory animals (inoculated intraperitoneally and into the meninges) when used in large doses.

As for its being the cause of the various epidemics of the past, Davis sums up the evidence against it as follows:²³ "It is not con-

stantly found in influenza by most observers. It is found commonly or more commonly in other diseases as pertussis. Inoculated into human beings it does not cause the disease; nor can it be produced by animal inoculation. The organism is pyogenic and causes leucocytosis; the primary blood picture in influenza is a leucopenia. Prophylactic influenza inoculations fail to protect appreciably against the disease; and its presence in influenza, which is prone to secondary invasions, may be explained on the basis that the bacillus is a ready secondary invader in many respiratory diseases."

Green Producing Coccii: On media containing hemoglobin, there are three types of green producing cocci, namely: the pneumococcus, streptococcus viridans, and the Mather's type of organism. The first two are quite common in healthy individuals and usually have been isolated from saliva, and less frequently from swabs of the throat and pharynx.

On blood agar plates, the pneumococcus appears in small colonies, flat, often umbilicated or checker-like, surrounded by a green zone of methemoglobin and revealing lancet-shaped diplococci.

Streptococcus viridans occurs in small round, gray, convex colonies with a similar green zone, while the Mather's type of streptococcus grows in colonies which are quite large and moist, with a mucoid appearance and a tendency to become confluent.

Of these green producing cocci the bile soluble and inulin fermenting types are classed as pneumococci, while the others are considered as streptococcus viridans. The crypts and slit-like folds of the tonsils and adenoids of normal individuals harbor these organisms constantly and in large numbers.¹²

The Incidence of Streptococcus Viridans and Pneumococcus in Cultures of Nasopharyngeal Swabs, Adenoids, and Tonsils.¹³

	Number of Persons	Percentage Positive	
		Pneumococcus	Strep. Viridans
Swabs	21	71.4	90.5
Series 1) Adenoids	21	71.4	90.5
Tonsils	21	66.6	81.0
Series 2) Adenoids	82	62.3	88.0
Total Number Adenoids	103	65.0	89.0

Furthermore, they are more numerous in the depths between folds of the adenoids than on nasopharyngeal surfaces.

The Incidence of the Pneumococcus in the Throats of Healthy Persons.¹⁴

Park and Williams	About 50%	1905
Lonscope and Fox	About 50%	1905
Buerger	About 50%	1905
Dochez and Avery	58.4%	1915
Stillman	About 45%	1916
Pilot and Pearlman	65%	1921

The Diphtheria Bacillus: Diphtheria bacilli in carriers are harbored almost always in the tonsils and adenoids. That the tonsils were the foci has long been known, numerous observers having found them in cultures from tonsilar swabs and from the extirpated gland.¹⁵ The organism is present on the epithelial surface, within the crypts¹⁶ and in the tissues between the epithelium.

The adenoids have been little studied until recently.¹⁸ In a series of 100 adenoids and tonsils, cultures were made from tonsilar crypts, adenoid surfaces and also between the folds of the latter.

Diphtheria bacilli were recovered in 12 instances, two of these strains being virulent, and pseudo-diphtheria bacilli were recovered from the tonsils in 17, and from the adenoids in 30 instances. The somewhat higher figures than most investigators obtained here is due to culturing to the tonsil crypts and adenoids, rather than culturing of the swabs of the throat.

Tonsillectomy and adenoidectomy, removing as they do the chief foci of the diphtheria bacillus, nearly always cures the carrier.^{19 20 21}

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29 East Madison Street.

LARYNGEAL CANCER, ITS TREATMENT, WITH SPECIAL REFERENCE TO TOTAL LARYNGECTOMY.*

DR. FIELDING O. LEWIS, Philadelphia.

To treat laryngeal cancer intelligently, one must bear in mind its clinical classification, for the location and extent of the lesion determines the method of treatment and, to a large extent, the life of the patient. The familiar classification is: first, the intrinsic, arising from the vocal chords, ventricles, ventricular bands, interarytenoid and subglottic area; and second, extrinsic, arising from the epiglottis, arytenoids, aryepiglottic folds, pyriform sinuses and the pharyngeal surface of the cricoid cartilage.

Statistics show that the intrinsic forms are the types most frequently seen, and that the vocal chords are the structures more often involved, it develops slowly, does not extend rapidly and metastasis is late, due to the confined arrangement of the laryngeal lymphatics. Because of its own particular lymphatic arrangement, cancer of the larynx, perhaps, more than any other organ of the body, affords the surgeon a better chance for a complete eradication, provided it has been recognized before it has extended beyond the confines of the cartilaginous box.

The extrinsic forms, on the other hand, have a rapid course, metastasis occurs early and operative procedures are much less hopeful, it is therefore obvious that an early diagnosis is of prime importance. To wait until painful phonation, odor, cachexia and dyspnea are present, is to defer until all hope has usually passed; second, but by no means less important, is the promptness in carrying out the most effectual form of treatment. You may ask how is a definite diagnosis to be made since much is written against the advisability of a biopsy, as in the opinion of some it may cause a rapid dissimulation? I would reply that a biopsy should be made in all cases, provided the patient's consent has previously been obtained by the surgeon to carry out at once whatever treatment he may deem best in the interest of the patient. I am quite convinced that I should not want my larynx split open or removed without a tissue diagnosis having been first made by an accomplished pathol-

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ogist. I have seen several cases that clinically were carcinomatous, but proven otherwise by biopsy and visa versa.

Cases of intrinsic carcinoma in which it is possible to excise the entire growth over an area sufficiently wide to include normal healthy tissue, are best treated by laryngo-fissure. The records of Jackson, St. Clair Thompson and others, show that 80 per cent of this type of cases are cured by this method. All other operable cases should, in my opinion, be treated by the more radical method of total laryngectomy. After a careful study and analysis of a large series of laryngeal carcinomas seen in conjunction with Dr. Jackson, in private practice and at the Radiological Clinic of the Philadelphia General Hospital, I am firmly convinced that surgery offers, by far, the greatest hope for the relief of this distressing and frightful malady, and I conscientiously believe that all operable cases of carcinoma of the larynx should be treated by surgery when possible.

Radium and Roentgen ray are, in my opinion, invaluable agents in the postoperative treatment of this disease, and their use in pre-operative treatment, in extrinsic cases, are often of great value in preventing the extension of metastasis. To treat willingly operable cases with these agents with no thought of surgery is, to my mind, a grave error.

The operation for total extirpation of the larynx was condemned by some laryngologists until recent years, because of its high mortality rate, by others because of the adverse criticism contained in the textbooks and other writings on this subject. I am sorry to note that in some of the modern textbooks, the following quotations are noted; one writer states: "If the operation succeeds, the patients lead such a feeble and painful existence that they might as well have succumbed to the original disease"; another: "Laryngectomy usually results in death within three years, even although recurrence may not have taken place"; and still another says: "Profound nervous depression and great fear of suffocation may follow it"; and many other equally depressing views are found. With improved technique and improvement in the after-treatment, the mortality has been greatly reduced, especially in the intrinsic cases. Of the forty-nine cases on whom I have performed this operation, not one has presented any symptoms of great mental depression or led a feeble and painful existence, but, quite to the contrary, they are mentally alert, enjoy a happy and useful life and in most instances are pursuing their previous occupations. Without the operation they could not have survived.

Many authentic cases with extrinsic involvement, which require extensive dissections, are reported living after many years, without

recurrence. Since the advent of the radio knife, I am quite optimistic in cases that were formerly thought to be inoperable. Laryngectomy is a formidable operation and the convalescence is often long and tedious, but what is that compared to long months of pain, sleepless nights, starvation and finally death? The patient must decide:

"I am the master of my fate,
I am the captain of my Soul."

Total laryngectomy may be performed by the one-stage operation or the two-stage operation. Some surgeons prefer the one-stage operation when possible, because the field of operation can be rendered more aseptic, thereby insuring a better chance of primary union, requires less time, consequently less shock to the patient, and better handling of the tracheal stump, so as to secure a better tracheal opening, while the advocates of the two-stage operation claim that there is less danger of mediastinal infection. My personal preference is the one-stage procedure.

Preparation of the patient. The patient should be admitted to a hospital at least three or four days before the operation, so that a complete physical examination by an accomplished internist may be made, this to include chemical and serological blood examinations and roentgenogram studies of the chest, in order to determine whether the patient is a suitable surgical risk. Should any malady be detected which would contraindicate operation and its correction not possible, the operation would be ill advised. Careful inspection of the nose and throat should be made to exclude paranasal sinus disease and chronic cryptic tonsilar disease, the presence of which would prolong convalescence and may lead to serious complications. Infected teeth are removed and dental hygiene carefully carried out by an expert dentist. The diet is restricted. Free elimination through the bowels and kidneys are essential.

Anesthetic: Local and general anesthesia, both have their advocates and a combination of the two is used by some. To determine the kind of anesthetic and its method of administration, the operator should consider the temperament and general condition of the patient and the competency of the anesthetist, as often quoted, "The best anesthetic is a good anesthetist". If the lumen of the larynx is sufficiently large to permit free and unobstructed breathing or if a previous tracheotomy has been done, I personally prefer rectal anesthesia by the ether and oil method if administered by an expert and careful anesthetist. By its method less ether is required and the absence of any ill effects that often follow other forms of an-

thesia have been quite noticeable. Ether anesthesia by the drop method is perhaps the safest and the one most frequently used. Opium derivatives should not be administered, as the cough reflex is a great aid in the expulsion of foreign secretions from the lungs.

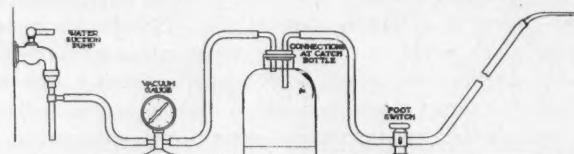
Operative technique shown by lantern slides. Presentation of two patients.

FOOT VALVE FOR SUCTION APPARATUS. A DEVICE TO INCREASE ITS EFFICIENCY.

LEE M. HURD, New York.

This foot valve is to hold the vacuum until required.

The ordinary suction apparatus of the water filter pump type has a very low vacuum unless the tube from the pump is closed; then the vacuum will rise in proportion to the water pressure. With 65 pounds water pressure the vacuum will reach 27 inches and by confining this vacuum with the foot valve there is a reserve that is strong and efficient. Also, whenever less vacuum is required, it is easily reduced by keeping the valve open until the vacuum registers the amount wanted. The suction continues just as long as the foot holds open the valve.



The rubber tubing from the pump and bottle is passed through the foot apparatus and the tubing is compressed by the apparatus and acts as a valve, pressure with the foot releases the compressed rubber tubing, permitting the air to rush through to overcome the vacuum.

The drawing shows the pump connected to water faucet and from pump thick walled rubber tubing extends to a vacuum gauge, then to a large bottle, at least 5-pint in size, the larger the better reserve; then the tubing passes through the foot shutoff, which constantly compresses the tubing and is only released by pressure with the foot from here. The tubing extends as long as is necessary to be connected with whatever instrument is required.

39 East Fiftieth Street.

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SPONTANEOUS NYSTAGMUS, VESTIBULAR AND
FUNCTIONAL HEARING TEST FINDINGS AS
AIDS IN THE DIFFERENTIAL DIAGNOSIS
OF INNER EAR AND EIGHTH NERVE
AFFECTIONS.*

DR. GEORGE W. MACKENZIE, Philadelphia.

When your Chairman and Secretary suggested the above subject for this evening's paper, the writer accepted their decision as evidence of an increasing popularity of the vestibular and functional hearing tests and a desire on the part of those who may have done less to learn how those who have done more make use of these tests in the diagnosis of their cases.

For a while it looked as though the labyrinthine tests were doomed to oblivion on account of the unfortunate publication of quite a number of articles on the subject by those who had conducted little or no researches in this field. For a while it looked as though nearly every writer on the subject of the labyrinth had a particular theory to expound. As a result those who were dependent upon what they read for their introduction to the subject were confused and as a result were forced to abandon the subject in despair. The attitude of some of the thinking neurologists was neither hopeful nor encouraging. Realizing this state of affairs and with a desire to have the profession hold fast to that which was true and not throw away the grain with the chaff, the writer presented a paper on the subject of, "Careful Technique in Making the Labyrinthine Tests", before the American Academy of Ophthalmology and Oto-Laryngology, in 1917, in which he pointed out that most of the erroneous conclusions arrived at up to that time were due to false premises, *i. e.*, faulty observations because of faulty technique in making the tests. In that particular paper the writer went so far as to point out some of Barany's errors and how they came to be made.

In view of the above mentioned conditions it is encouraging to one who is intensely interested in the subject to be invited to present his clinical experience in the diagnosis of ear conditions from the findings revealed by the so-called labyrinthine and functional hearing tests. The time limit will permit of but a fragmentary presentation of the subject. Many things of interest must necessarily be omitted.

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*Read before the Section on Oto-Laryngology of the Baltimore City Medical Society, Jan. 22, 1925.

Let us consider first those labyrinthine affections secondary to middle ear suppuration. According to their extent they may be divided into *A*, the circumscribed, and *B*, the diffuse. According to the character or intensity of the inflammation present they may be divided into *1*, irritative, and *2*, destructive.

The circumscribed labyrinthine affections secondary to middle ear inflammation may be limited to one of the canals (the external most frequently), to the vestibule or to the cochlea.

A, 1: Circumscribed irritative labyrinthine affection may be met within the course of middle ear suppuration, acute or chronic. In the chronic cases there is frequently associated a cholesteatoma which, in its growth, causes a resorption of the bony prominence, eventually producing a fistula of the bony external semicircular canal, leaving the membranous canal intact, but congested. Occasionally the congestion of the membranous semicircular canal occurs in the absence of a fistula of the osseous canal. In a case of this kind the outstanding symptoms and signs are as follows:

1. More or less vertigo: In this case, a false sensation of turning in the horizontal plane toward the affected side.
2. Equilibrium disturbance: Reaction movements in the direction opposite to the vertigo.
3. Spontaneous horizontal, nystagmus toward the affected side, which is increased when looking toward that side and decreased when looking away from it.
4. After-turning, horizontal, nystagmus increased above the normal (24 seconds) to both sides; and more so toward the affected than the unaffected side.
5. Caloric reactivity is preserved.
6. Galvanic reactivity is preserved.
7. Fistula test is positive if a fistula is present, but a fistula is not always present. When a fistula is present compression of air in the external auditory canal will usually produce a horizontal nystagmus toward the same side, providing large polyps in the external auditory canal do not interfere with the test or there is not an overly patulous Eustachian tube to permit the escape of air in that direction. Wherever a fistula of the osseous external semicircular canal is present with an intact membranous canal and there is nothing to interfere with the piling up of air pressure in the middle ear spaces, there occurs the so-called compression nystagmus, which consists of a horizontal rhythmic nystagmus toward the same side; and when

aspiration is applied there occurs the so-called aspiration nystagmus which consists of a horizontal nystagmus in the same plane, but opposite direction to and less intensive than the compression nystagmus. The aspiration nystagmus is less intensive for the reason that it is not possible to obtain so intense a negative pressure as it is a positive one.

The functional hearing tests are not influenced in cases of circumscribed lesion of the labyrinth so long as the affection is limited to the external semicircular canal. The fork findings will, therefore, be the same as those which are characteristic of obstructive deafness, pure and simple.

We shall not discuss at this time the findings of circumscribed irritative lesion of the other parts of the labyrinth for the reason that they are relatively few as compared with lesions of the external semicircular canal. The writer was afforded the opportunity of studying closely a case of circumscribed irritative lesion of the posterior semicircular canal, which is quite rare. To report this case properly, that is to do it justice, would require at least a half-hour, possibly longer.

A, 2: Circumscribed destructive lesion of the labyrinth secondary to middle ear suppuration may occur in any part of the labyrinth, but again, the most common site is the external semicircular canal. The difference pathologically between this and the previously mentioned condition is one of intensity. A destructive lesion is but a more advanced stage of an irritative one. The irritative is due to the seeping into the membranous external semicircular canal of toxins generated by the bacteria present in the middle ear. If the suppuration in the middle ear is not cleared up in the course of time the barriers fail to check longer the pus organisms, when they find their way into the semicircular canal with resulting suppuration. If this suppuration remains limited to the canal we have a circumscribed destructive lesion of the labyrinth.

In the case of a circumscribed destructive lesion of the external membranous semicircular canal with or without a fistula of the osseus canal, we find characteristically:

1. Vertigo, always present in a recent case; while in a latent one (of a few weeks or longer standing), the vertigo is but slight and is elicited only upon quick movements of the head. The subjective sensation of vertigo when present is one of turning in the horizontal plane away from the affected side.
2. Equilibrium disturbances (reaction movements) are axial and in a direction opposite to the vertigo (false sensation of turning).

3. Spontaneous horizontal nystagmus is present and is directed away from the affected side.

4. The horizontal after-turning nystagmus is decreased below the normal (24 seconds) to both sides, but especially toward the affected side. It is reduced in the average case toward the unaffected side to about 16 seconds and toward the affected side to about 8 seconds. The rotary after-turning nystagmus is not changed.

5. The caloric reaction is preserved for the vertical canals, but lost for the horizontal. In other words, so far as the vertical canals are concerned when cold water is syringed into the external auditory canal with the patient's head erect, there follows a purely rotary nystagmus toward the opposite side, as occurs in normal individuals. On the other hand, if the head of the patient is inclined to the opposite shoulder so that the horizontal (external) semicircular canal lies quite in the vertical plane, there follows no horizontal nystagmus toward the side syringed with cold water as occurs in the case of an intact or even hyperirritable (congested) external semicircular canal.

6. The galvanic reaction is preserved in this as in all cases of labyrinthine affections with intact VIII nerve.

7. The fistula test so far as the destroyed (suppurating) semicircular canal is concerned must be negative since there is nothing to react, even in the presence of a fistula of the osseous semicircular canal.

8. The functional hearing test findings, so long as the lesion is a circumscribed one limited to the nonacoustic labyrinth, are not altered. In other words, the findings are characteristic of obstructive deafness because of the middle ear disease.

B, 1: Diffuse labyrinthine irritation secondary to middle ear suppuration must be a very rare condition, for the reason that in most cases the bacterial toxins in the middle ear invade the labyrinth at one location only (the external semicircular canal, the oval or round window or the promontory). It is a very unusual coincidence for the labyrinth to be invaded at several places simultaneously. Diffuse congestion is more likely to occur in the course of general diseases in which the toxin circulates through the general blood stream. Diffuse irritative labyrinthitis could possibly occur in the course of middle ear suppuration as a result of congestion, the forerunner of a diffuse suppurative labyrinthitis. The duration of the congestive stage of labyrinthitis is variable, but on the average it is a matter of hours rather than days or weeks. However, it is possible in exceptional cases for the process to be arrested in the congestive (pre-

suppurative) stage with more or less complete restoration of function. The fact is that our knowledge of diffuse labyrinthine irritation secondary to middle ear suppuration is considerably limited because it is found but rarely in comparison with the other forms of labyrinthine affection.

The symptoms and signs are as follows:

1. Vertigo, much like that found in the circumscribed irritative affection of the external semicircular canal recorded above may be present. However, there is a difference, in that, in the case of the circumscribed lesion of the labyrinth the vertigo is usually less intensive than in the diffuse lesion. Again, the false sensation of motion is limited to the horizontal plane in the former condition, while in the latter it is a sensation of combined turning in the horizontal and a falling sensation in the frontal plane. In both cases the direction of the false sensation of turning, or falling, is toward the affected side.
2. Equilibrium disturbances (reaction movements) are both axial and frontal so that the patient falls in a direction opposite to his vertigo. In other words, he falls away from his affected side.
3. Spontaneous, mixed, horizontal and rotary nystagmus is toward the affected side, since all canals are affected simultaneously and not a single one as happens in the case of a circumscribed lesion.
4. The after-turning nystagmus for both the horizontal and the rotary is increased above the normal to both sides, but more so toward the affected side.
5. The caloric reaction is preserved for all canals.
6. The galvanic reaction is maintained.
7. The fistula test may be positive or negative. When the fistula sign is present it speaks for a fistula of the osseous labyrinth with a reactive membranous one and nothing more. It does not tell us whether the membranous labyrinth is functioning more or less than normal.
8. From the standpoint of the hearing apparatus, there is usually Tinnitus aurium present. At the same time the presence of the tinnitus may so influence the functional hearing test findings as to cause them to be no longer of the purely obstructive type. In other words, though a negative Rinne may be found the bone conduction is not so long as it ought to be for a case of pure obstructive deafness, nor is it short enough to be characteristic of perceptive deafness. As the diffuse labyrinthine congestion improves the functional hearing test findings lose that element (relative shortening of the bone conduction) which speaks for perceptive deafness.

B, 2: Diffuse labyrinthine destruction secondary to middle ear suppuration compared with the preceding condition is relatively frequent. It is synonymous with diffuse labyrinthine suppuration. This was the earliest recognized clinical entity made possible of exact diagnosis by the aid of the various labyrinthine tests, so ably developed by Barany and the other associates of Politzer during the first decade of the present century. The symptoms and signs are as follows:

1. *Total deafness of sudden onset* in the course of middle ear suppuration. The best method for determining total deafness is the combined use of the speaking tube and the noise producer. For instance, if the right ear is the one in question, we introduce into the external auditory canal of that side, the receiving end of a long (2 or 3 meter) speaking tube and into the other ear the receiving tip of a noise producer. While an assistant operates the noise producer, the examiner talks to the patient through the bell end of the speaking tube, using both the conversational and the whispered voice. If the patient is not able to recognize conversational voice, spoken into the tube, it may be accepted as ample evidence, in fact the best we have up to date, of total deafness.
2. Vertigo is present in recent cases. It is less evident in latent ones. The vertigo of diffuse suppuration is more intense than that of a single canal affection. The subjective sensation is one of combined falling and turning toward the side opposite to the lesion.
3. The equilibrium disturbance is manifested by actual falling or turning on the part of the patient toward the side of the lesion. This occurs because of his efforts to correct the false sensation (vertigo) of falling and turning to the opposite side.
4. Spontaneous, mixed, horizontal and rotary nystagmus is directed toward the side opposite the affected ear, that is, away from the lesion, so to speak. The nystagmus is quite pronounced early, but gradually diminishes, until it becomes *nil* or almost *nil* after a few weeks or months. However, the writer has seen several cases in which there was a minimal degree of nystagmus present a year after an operation for the exenteration of the labyrinth.
5. After-turning *horizontal* nystagmus is diminished toward both sides, but more so toward the affected one. The most characteristic findings in a recent case is 16 seconds duration for after-turning nystagmus toward the unaffected side and 8 seconds duration toward the affected side. These figures gradually change so that after several months they become 13 and 11 seconds. However, the sum of

these two figures equals 24 seconds as it did above, that is, 16 plus 8 equals 24 seconds as compared with the normal, 24 seconds to each side.

The after-turning *rotary* nystagmus in a recent case is about 12½ seconds toward the unaffected and 6½ seconds toward the affected side. These figures gradually change, when after several months or a year they are approximately 11 and 9 seconds. Again, the sums equal the same in a latent as in a recent case; that is, 20 seconds. The figures in the oldest case the writer has seen have never been exactly the same on the two sides. It is always a trifle less toward the affected than the unaffected side.

6. The caloric nystagmus is *nil*. No amount of cold water syringed into the ear for long periods will alter the already existing nystagmus no matter in what position the head is placed.

7. The galvanic reaction is positive on the affected as well as on the unaffected side by reason of the fact that the electric current reacts upon the nerve, even where the inner ear is destroyed.

8. The fistula test is negative even in the presence of a fistula since the end organ in the Crista ampullaris has been destroyed by reason of the diffuse suppurative (destructive) process in the labyrinth.

Diffuse serous labyrinthitis secondary to middle ear suppuration is a condition referred to by quite a few writers; which, to those who have reported cases presents all the symptoms and signs of labyrinthine destruction like that found in suppuration. The only difference in the two conditions is that in the case of serous labyrinthitis there is more or less restitution of function after the attack has passed over; while in the case of suppuration no restitution of function is possible. The writer has seen at least seventy-five cases of suppurative labyrinthitis, practically all of them carefully studied by himself; whereas, he has not seen a single case of serous labyrinthitis. During his three years' stay in Vienna, much of which was spent in the Politzer Clinic, he would rarely hear about a case of serous labyrinthitis and then only during the course of someone's lecture; but when investigated they usually turned out to be cases of suppurative labyrinthitis. Serous labyrinthitis is rather difficult to prove, even though it be present. On the other hand, that the writer has not seen a case does not prove the nonexistence of serous labyrinthitis. He merely wishes to point out the fact that if it does exist it must be an extremely rare condition.

There is another form of destructive labyrinthitis which presents almost the identical symptoms and signs of diffuse suppurative labyrinthitis. It is a condition which the writer has chosen to designate perilabyrinthitis. A condition in which the infection involves the perilabyrinthine pneumatic cells (extension from the mastoid). In this condition the osseous labyrinth necroses and sequestrates.

This is not a rare condition. Almost every otologist of experience has seen at least a few cases of the kind. There is commonly an underlying dyscrasia, tuberculosis, syphilis or diabetes, associated with the mastoiditis.

The symptoms and signs of perilabyrinthitis are the same as those of diffuse labyrinthine suppuration, plus a facial paralysis. Involvement of the facial nerve occurs since the facial canal falls to the ground under the same conditions which produced the necrosis and sequestration of the labyrinthine capsule.

There is still another form of diffuse labyrinthine destruction secondary to middle ear suppuration of the chronic form. In this connection the writer recalls having been asked on more than one occasion, "Do you advise operating upon every labyrinth in which you find symptoms of labyrinthine destruction"? The answer has been "no" for the reason that there exists a destructive process of the labyrinth which is very chronic and nonsuppurative; namely, chronic plastic labyrinthitis, which causes a gradual, but progressive metaplasia of the end organs. Thus it is possible to have clinically identical end results in two separate conditions, acute suppurative labyrinthitis and chronic plastic labyrinthitis.

In addition to the diffuse destructive forms of labyrinthine affection, secondary to middle ear suppuration, in which we find total deafness and total loss of vestibular function, there exists other forms of destructive labyrinthine inflammation; namely, that form of labyrinthitis which is found rather late in the course of hereditary syphilis. It occurs as one of the manifestations of the so-called Hutchinson's triad, which includes: 1, the characteristic malformation of the teeth; 2, interstitial keratitis; and 3, deafness. Labyrinthitis syphilitica tarda is the name which seems to best fit this condition since it appears rather late, between the fifth and thirtieth years of life, in children born of syphilitic parents, and the pathology is limited to the labyrinth. The affection is bilateral. It is only slightly amenable to the usual forms of antisyphilitic treatment. The obstinacy of this disease is comparable with that of interstitial keratitis. The symptoms and signs are as follows:

1. Bilateral deafness, which is usually very pronounced and occasionally complete. The progress tends to be very rapid. The functional hearing tests reveal findings characteristic of deafness of the so-called perceptive type.

2. Vertigo is not a constant symptom of the affection for the reason that the loss of vestibular function is bilateral, in which case there is not the same imbalance of vestibular function as occurs in unilateral loss of function.

3. Equilibrium disturbances are present, but are not identical with that found in unilateral destruction of the labyrinth. The patient is fairly able to retain his balance with the eyes open, but with the eyes closed the ability to maintain perfect equilibrium is considerably impaired. This impairment is more evident when the patient attempts to walk. There is not, however, the pronounced equilibrium disturbance with the eyes open, as occurs in the recent cases of unilateral destruction.

4. Spontaneous nystagmus is less evident in this affection than in the unilateral forms of labyrinthine destruction. In fact, it is only found in the very recent cases and where the degree of destruction is appreciably more marked on one side than on the other. In later cases and in those where the destruction of the labyrinth is about equal on the two sides there is no spontaneous nystagmus.

5. The after-turning nystagmus is materially diminished and in some cases entirely lost on both sides.

6. The caloric reaction is appreciably diminished and in some cases entirely lost on both sides.

7. The galvanic reaction is both positive and normal on both sides, even in those cases where there is not the least sign of after-turning nystagmus or caloric response. It is this normal reactivity of the VIII nerve to galvanism which tells us that the loss of hearing and vestibular function is due to a pathologic process limited to the inner ear. Besides, it helps us to distinguish this process from another form of syphilitic deafness (*Neurolabyrinthitis syphilitica*), about which more will be said later.

There remains still another form of diffuse destructive labyrinthine affection worthy of our consideration, and that is cases of basal skull fractures involving the petrous bone, particularly those in which the fracture is comminuted or where the edges of the fracture override one another. This is a fairly common injury. It is an injury which calls for consultation with an otologist. According to Bezold about one-fourth of all basal fractures pass through one

or both temporal bones. The symptoms and signs of basal fracture involving the petrous bone are briefly as follows:

1. Bleeding from the ear. Concerning this symptom, which is a very important one, a distinction must be made between blood and blood mixed with cerebrospinal fluid. When the blood is unmixed with fluid, it appears thick and tends to coagulate promptly. When the blood is mixed with fluid, there is apparently no tendency to coagulation. The flow in this latter instance will tend to keep up for days. In the former instance the fracture has not involved the dura, while in the latter instance it has. Where the dura is intact there is less likelihood of leptomeningitis complicating than in those cases where the dura has been lacerated. Furthermore, where the flow from the ear is free and long continued, the loss of hearing and of vestibular function will be permanent, even though the patient, otherwise, recovers.

2. Facial paralysis is quite common in the cases of the more severe fractures (comminuted with overriding edges).

3. Complete loss of hearing in the more severe cases is comparable with that found in labyrinthine suppuration.

4. Severe vertigo is present like that found in labyrinthine suppuration (see above).

5. Equilibrium disturbances are present like that found in labyrinthine suppuration.

6. Mixed rotary and horizontal nystagmus is directed toward the intact side in cases of unilateral involvement. In cases of bilateral involvement the patient is usually in such bad shape that there is but little, if any, opportunity afforded to study the symptoms and signs carefully. Even in some of the unilateral cases the fracture is so extensive that the patient is already comatose when seen. In this case the examiner finds a conjugate deviation of the eyes directed toward the affected side in place of the nystagmus directed toward the unaffected side, observable in the conscious patient.

7. The after-turning nystagmus findings are characteristic of those found in a destroyed labyrinth from any cause.

8. Caloric reaction is negative on the affected side. It is well to emphasize here the fact that this test should never be attempted in cases of injury of any kind in which there is a recent rupture of the drum membrane because of the risk of washing bacteria from the external canal into the tympanic cavity with resulting infection that endangers life.

9. The galvanic reaction is variable, depending upon the course of the fracture and the structures involved. It is not characteristic. On the other hand, where the reaction is negative there is reason to suspect the fracture to be more extensive than where it is found to be positive.

The preceding condition (fracture of the petrous bone involving the labyrinth and the facial nerve) is not the only kind of fracture of the temporal bone that occurs. We meet with fractures of the temporal bone in which the petrous portion escapes. Fractures in which there is a flow of blood or blood mixed with cerebrospinal fluid, just as may occur in the previously described petrous bone fractures. They are fractures which pass through the squamous bone, involving the tegmen, tympani and antri, and in which there occur no symptoms referable to the acoustic or nonacoustic labyrinth. The impairment of hearing in these cases is characteristically that of obstructive deafness.

A great deal more could be said about the subject of fractured skulls involving the temporal bone if time permitted. It is a borderland subject which belongs quite as much, if not more, to the otologist than the neurologist or the general surgeon. It is a subject which the otologist appears to be more willing to share with the general surgeon than the general surgeon appears to be willing to share with the otologist, judging by the neglect of attention this class of cases receive in the average hospital.

Owing to the length of time already consumed the writer will refrain from discussing the subject of neuritis of the VIII nerve at this time further than to refer briefly to but one very common form, and the reason for including mention of this particular one is the fact that reference was made to it above, when speaking of deafness of congenital syphilitic origin. The condition referred to is Neurolabyrinthitis syphilitica, a subject about which the writer has already written quite freely.

The pathology is that of a meningoneurolabyrinthitis of acquired syphilitic origin. The process begins in the meninges and spreads peripheralward along the sheath of the nerve to the spiral ganglion in Rosenthal's canal and in rare cases it extends as far as the intra-labyrinthine spaces. The symptoms and signs are as follows:

1. There is bilateral deafness, which is rarely so pronounced as that found in the congenital syphilitic form of deafness. Again, in the acquired form there is likely to be a greater difference in the intensity of the involvement on the two sides. The functional hear-

ing tests show the same general characteristics in both conditions, that is, deafness of the perceptive apparatus type.

2. Vertigo is more likely to be present in Neurolabyrinthitis syphilitica than in Labyrinthitis syphilitica tarda, for the reason that an imbalance in the intensity of the involvement on the two sides is more common in the acquired than in the congenital form.

3. Equilibrium disturbance is more often met with in the acquired form than in the congenital for the reasons given in the preceding paragraph.

4. Nystagmus is more common in the acquired than in the congenital form of affection for the same reasons as given in the preceding paragraph.

5. The after-turning nystagmus is diminished appreciably, but as a rule, not to the same degree as in the congenital disease.

6. The caloric reaction is more likely to be present in the acquired than in the congenital affection.

7. The electrical reactions are seriously impaired in the acquired form while it remains quite normal in the congenital. This is the most important differential finding in these two conditions.

Tumors, including gumma of the temporal bone, involving the labyrinth and tumors of the internal auditory canal involving the VIII nerve are subjects in themselves and must necessarily be omitted in a limited paper.

The intention of the writer before he began the preparation of this paper was to present in the most concise form the differential diagnosis of inner ear and eighth nerve affections by the aid of the vestibular and hearing test findings. He finds that he has not succeeded as well as he had hoped, in that he has consumed more time than he anticipated and left a good deal of importance unsaid.

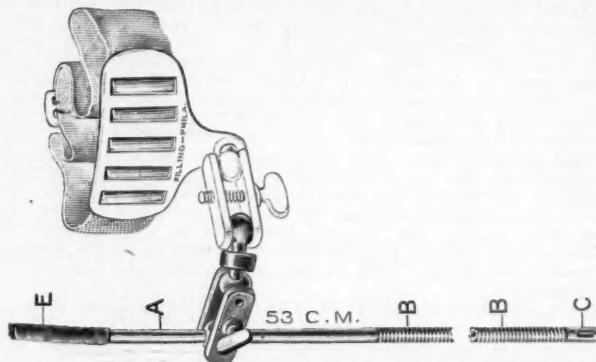
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DR. WILLIAM FREDERIC MOORE, Philadelphia.

An instrument designed for retention in the bronchi where aspiration of fluids is desired over protracted periods.

This instrument is 53 c.m. in length, on all, by 3½ m.m. in diameter. Made flexible by winding copper or German silver wire and hammering to obliterate the interspaces due to winding. The end, which is inserted into the trachea and bronchia terminates, with lateral eyelets and one at the end, which is rounded to prevent trauma during insertion. The part protruding from the patient's mouth, after insertion, terminates in a solid tube which is held in position



by a head strap. This part of the tube is then attached to the ordinary suction machine which develops approximately ten pounds negative pressure. During use the patient's jaws are separated with the ordinary bite block used in bronchoscopic work. The instrument is made either rubber covered of 3 m.m. diameter or without the rubber sheath with a 3½ m.m. diameter.

It can be inserted with or without a stiffening stilette, using the Jackson laryngoscope to open the glottis or where it is desired that it be placed in a definite bronchus to drain a particular part of the lung, it can be inserted through the Jackson bronchoscope. If used in the latter way, the addition of 25 c.m. of fairly stiff rubber tubing to the aspirator at the proximal end will allow the withdrawal of the bronchoscope without displacing the tube.

From the Bronchoscopic Clinic, Jefferson Hospital.

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THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOTOLOGY.

Regular Meeting, February 13, 1925.

Paper: Some Clinical Remarks on Modified Radical Mastoidectomy for Chronic Purulent Otitis Media as Practiced by the Author. Dr. Hugh B. Blackwell.

DISCUSSION.

DR. ALFRED KAHN said that when he first heard Dr. Blackwell's discussion of this operation some years ago he was very much opposed to it, as were the majority of otologists at that time. Indeed at a meeting of an Otological Section at about that period he was very seriously attacked on the subject. Today, however, Dr. Kahn said he was of a very different opinion, for he had had more experience and felt that the operation had a definite field, though he did not agree with Dr. Blackwell as to what were the indications for it. For example, in certain cases it is difficult to decide beforehand just what form of operative procedure would be indicated. In a recent case at the New York Eye and Ear Infirmary a patient had a large posterior opening following a mastoid operation in which it was impossible to get the wound to heal. Two operations were done; finally the wound was opened and a modified radical operation done; then a skin graft was put in (probably the first skin graft ever done in conjunction with an operation of this type). The posterior wound was left open until the new skin adhered. The usual procedure of simply drawing the flaps of the wound together was not used because there was not sufficient tissue to make closure. By doing the modified radical procedure we were able to secure sufficient tissue to close the wound. Here we have an indication for the modified radical procedure.

As to the insurance statistics, Dr. Kahn said that judging from his experience he felt that the insurance companies are unfair to assume that these cases should be rated at ten to fifteen years beyond their age; he did not believe statistics would support that.

To his mind the indications for the operation would depend largely on the condition in the middle ear. If the middle ear is without necrosis and the drum intact, it would seem that this operation might be done, but if you are not sure about middle ear necrosis, the modified operation would be doubtful. Speaking of discharge from a chronic ear, the correctness of the term chronic mastoiditis would depend on the condition; if there is a discharge from the middle ear simply, one would not be justified, from that alone, in saying that there was a chronic mastoiditis. On the other hand, if you have a perforated drum, and the bones of the middle ear are necrotic, or partly destroyed, or even if the bones are healthy and there is a perforated drum with a discharge from the middle ear, he could not see the reason for this form of operation; he could not see what would be gained.

About curetting the Eustachian tube; the tube cannot be attacked through a modified radical opening. Through a radical opening it can be readily scraped. Quite true, it may not close off; however, many of them do and therefore it is worth while trying. Skin grafting is also an aid in closing off the tube. He did not think skin grafting was appreciated as much as it should be.

Dr. Blackwell's technique was ideal; it is a beautiful piece of work and only one criticism might be made, that is the cutting of the temporal muscle; probably the operation could be done without doing that.

DR. H. M. SCHEER said that during the last year the doctors on the service of Dr. John R. Page at the Manhattan Eye and Ear Hospital

had become enthusiastic on the subject of Dr. Blackwell's modified radical because Dr. Page himself was a close adherent for it in indicated cases. Eight or ten of these operations had been performed in the last year, and the results were such as to confirm the impression that there is a certain indication for it, namely, a chronic otorrhea which has been treated over a period of three to five months; thoroughly treated, locally; and intranasally, through the nose and nasopharynx, all pathology in these parts removed or corrected. If after such treatment the chronic otorrhea persists, and if the drum is partially present—for one cannot have a chronic otorrhea without a perforation in the drum—so if the drum is not entirely destroyed, and if the hearing is fair, and if the middle ear has a fairly normal appearance, even if a small amount of granuloma is present, or even if the handle of the malleus is partially gone, in that type of case the modified radical operation has been done, and we have seen it followed by a dry ear within eight to twelve weeks. The indication of a partially present drum is quite important, for the reason that when the modified radical operation is performed, Dr. Page and others have seen that the drum is regenerated, so much so that where there was only a rim of drum remaining the entire drum has regenerated, and not alone did the discharge stop, but there was a normal appearing drum, with the big cavity following the plastic closure well filled in, except for the large meatus, well dried, and no discharge.

On the other hand, it has been found that where the drum is entirely absent, the ossicles practically gone, the middle ear looking very badly, filled with cholesteatoma or polyp; and the hearing quite bad, so that the radical operation cannot do any more harm to the hearing, the radical operation is the procedure in preference to the modified one.

Dr. Scheer said that in the last few weeks he had operated on a child of seven with a big perforation that showed the handle of the malleus gone, and a big polyp, profuse odoriferous discharge, etc., at the time of operation. This operation was done, and in three weeks the upper part of the cavity was drying up; the discharge was not one-tenth of what it was previous to the operation, and the middle ear began to look cleaner and more healthy. These experiences have led him to feel that otologists should employ this operation more than they have been doing, and should make it an intermediary step before doing a radical operation unless the radical operation is absolutely indicated. Dr. Page advises doing this operation and taking the chance of getting good hearing, and then if it does not result properly there is time to do the extensive radical mastoid operation.

DR. MAYBAUM said that he feels that the real advance in aural surgical technique during the past twenty-five years has been not along lines of conservation but of thoroughness in operative procedures whether applied to the simple or radical mastoid operation. One of the objections to the modified radical operation is the likelihood that it may be employed frequently without clear and definite indications, including in its scope all types of chronic discharging ears. For a case of chronic middle ear suppuration with actual or threatened complication a thorough radical mastoid operation must be done. The presence of a cholesteatoma is a clear indication for a complete radical operation; in these cases it is necessary to thoroughly inspect the meato-mastoid cavity; the condition of the bony labyrinth, the presence of an erosion of the tegmen tympani or necrosis elsewhere in the middle ear must be brought to view through a wide open cavity and any half-way measure will not answer the purpose.

Undoubtedly there must be a comparatively small group of cases for which a modified radical operation such as Dr. Blackwell describes, is indicated. A complete simple mastoidectomy might answer in such cases. One is apt to become over enthusiastic regarding an operation of this type and to carry the indications for operation along these lines to cases which might with a little more patience respond to local treatment.

Dr. Blackwell is to be congratulated upon the results obtained in the cases which he has presented. Dr. Maybaum believed that Dr. Blackwell should be clearer in stating the indications and contra-indications for the modified radical. He stated that the important fact regarding the operation is the retention of good hearing. The question of the change in hearing after a radical mastoid operation depends upon a number of factors. In some cases the hearing is improved, while in others it is made worse. A good deal depends upon the degree of hearing before operation, and upon the care with which the after-treatment is followed. Healing results depend upon the operative technique, ability to close tube, etc. Proper packing of the tympanic cavity is important. It is not necessary to carry the packing back into the mastoid cavity, the latter is allowed to fill up with granulation tissue, the packing being firmly introduced to the inner tympanic wall and a short distance back.

In closing, Dr. Maybaum said that he had not done any of the modified radical operations, as the cases requiring such an operation had not presented themselves to him. He was, however, much interested in the results obtained by Dr. Blackwell.

DR. SAUTTER thought that Dr. Blackwell's paper was most convincing, especially after seeing the pictures and remembering the cases he has demonstrated, but could not altogether agree with what had been said. From the observation of modified radical cases which he has seen in the past, the results are very good; but from his own experience in surgical work on chronic mastoiditis he questions the selection of the cases just shown. Recently he had seen two cases, one of them operated upon by the most devoted and enthusiastic exponents of the modified radical method and the other by a prominent continental surgeon, and in both instances the ear was still discharging and the hearing was not any better than in any other case operated upon by the radical technique. Dr. Sautter said he had not himself operated on many of these cases by the modified radical method, but judged from his own experience in the surgery of chronic suppuration. Everyone knows of the progress of the modern technique, including that known as Dr. Blackwell's method, which has been wonderfully developed in the last fourteen years; he has made it more complete and has gained better results. It is the same with the radical mastoid operation. We have learned to do it better and to keep down the granulations, and to use the skin graft; in this way better results are accomplished and good hearing is obtained. The radical mastoid, however, must be followed up after operation; it must be observed and treated three or four times a year on the average and kept clear from cerumen. In that way the tissues are safeguarded and the condition of the hearing is much better. One can place a plug in the radical cavity and get improved hearing.

Dr. Sautter said he had tested out some of these cases presented by Dr. Blackwell and found that the hearing was practically the same as in his own radical cases and some others he has seen.

Dr. Blackwell had mentioned the reluctance of many men to do the radical operation. Many physicians and even many aural surgeons are rather provincial when it comes to real knowledge of what the radical mastoid operation will do. How many cases of facial paralysis are seen today after the radical mastoid operation? One great advance has been made in regard to the packing. One should be very careful about the packings, and they should be taken out after twenty-four hours whenever there has been an exposure of the facial nerve and give the ear a chance for aeration, and eventually the case will clear up with no facial neuritis.

I remember several of my cases in which it would have been impossible to have performed a modified radical because of an inaccessible mastoid antrum, due to a far forward sinus, so that to eradicate the disease it was necessary to take down the posterior wall through the tympanic cavity. Other cases in which there were extradural abscesses had to be drained from the middle fossa in the area adjacent to the tympanum. A modified radical could not accomplish this purpose.

Dr. Sautter closed by saying that in his opinion the modified radical operation seems to be a compromise, and that in those cases which show improvement the same thing would be accomplished by a simple mastoid operation.

Dr. J. J. GUEVOR said anyone who has done the modified radical operation or has seen some of its results must admit that this operation so admirably illustrated tonight by Dr. Blackwell supplies a necessary want between the simple mastoid and the radical operation. There are many cases of chronic otorrhea for which the simple mastoid operation will not suffice, and while they have not reached the stage for which the radical is indicated, such as extensive cholesteatoma, granulations or polyps in the middle ear, if the modified radical is done early a large number of such patients would be relieved of their condition and saved from the ultimate necessity of a radical operation.

There are some points, however, which may not be amiss to discuss in detail. Dr. Blackwell referred to the continuation of the discharge after the radical operation. This may occur also after the modified radical. One of the most frequent causes of this condition is the non-closure of the Eustachian tube. Another cause which has been pointed out by Dr. John R. Page is the condition of the mastoid bone. An apparently healthy bone may contain necrotic cells within it, and interfere with the healing process. Instead, therefore, of removing only a narrow strip of cortex as practiced by most surgeons, Dr. Page advises complete extirpation of the mastoid in all forms of radical and modified radical operations.

Dr. Blackwell suggests the removal of the epitympanic ring as a routine procedure. This rule is not followed by some surgeons. Dr. Page is guided by conditions found. He takes off the ring if conditions in the tympanum calls for it. However, not only does he leave the ring when it is in a healthy condition, but even if granulations cover the area of the ossicles and ring and after clearing these away the ring is found to be little damaged, he sometimes prefers not to remove it.

Dr. Maybaum suggests the radical operation in all cases of cholesteatoma. In Dr. Page's clinic some cases with extensive cholesteatoma have had the modified radical done with fairly good results.

Given any case of chronic otorrhea it is not possible to determine in advance which form of operation is indicated. Even cases with comparatively small perforations in the drum may contain sufficient changes in the middle ear to make the radical necessary. It is not until the mastoid is opened and the destructive changes found not to extend into the tympanum that the modified radical is the choice par excellence.

Taking it all in all, there is a large number of cases of chronic otorrhea where the modified radical can easily replace the radical operation. Particularly in children and young adults the modified radical obtains wonderful results, with better prospects of preserving the hearing than can be expected in the complete radical operation.

DR. CLARENCE H. SMITH said he had never done Dr. Blackwell's operation, but it sounded very attractive. Recently he had had the opportunity of seeing Dr. Heath in London do some mastoids after his modified technique. The difference between the Heath operation and the Blackwell operation is that Dr. Heath leaves a part of the bony ridge external to the aditus, claiming that it is impossible to keep the drum in place unless that support is left. This prevents one from cleaning out the attic as in the Blackwell operation. Heath is very enthusiastic about his operation and uses it in cases of simple mastoiditis as well as in many cases of subacute and chronic purulent otitis. He recognizes, however, that there is a need for the radical mastoid and occasionally uses that, but his own operation is the one he usually employs. The great point in the modified radical operation, as in the Heath operation, is the preservation of the hearing, and it stands to reason that in the Blackwell operation where you leave the remaining portion of the drum untouched, and the ossicles, you get better hearing than if you take out the ossicles, as in the radical operation. There is a very marked difference in the hearing, and that is an important object.

Dr. Smith said he was glad to see the cases shown by Dr. Blackwell, and to see that Dr. Blackwell was able to keep the drum in place after taking down the bony ridge, and when he has a suitable opportunity he will try this modified radical operation.

Dr. BLACKWELL said that the mortality statistics in his paper relating to the number of deaths due to ear disease had been taken from the Census Bureau reports for the years 1911 to 1921, inclusive, and were based upon the returns of thirty-five states only. For 1921, which was the last year available, there were some 2800 cases in which the deaths were attributed to ear disease. There were also many more that year who died from meningitis. It is of course a question whether in some instances the ear cases have been falsely grouped under this diagnosis.

Dr. Blackwell said that the policy of the insurance companies is largely based upon the reports of the actuaries employed by them, whose business is to look into the various causes of death and calculate the percentage of risks for the various ages in different diseases. The companies are naturally in business to make money and their policy with regards to patients suffering from chronic otorrhea is based upon the life risk to the patient so afflicted. As I have stated before, great many companies refuse to accept such individuals on any basis and those who do only accept such individuals at a greatly advanced rate of interest, as regards the suggestion that insurance men consult with otologists before deciding what disposition to make of a particular case of O.M.P.C. Dr. Blackwell said that he failed to see how such a consultation would be of much assistance to the company, as their policy is necessarily based not upon individual cases but what actually is the incidence of death in a large number of cases of chronic otorrhea, a question which the average otologist is not qualified to answer. We have also been asked how it is possible for a patient in which there is a necrosis located in the middle ear or ossicles to be benefitted by the operation which we have described. We would like to ask how does one diagnose necrosis in this region and what is its significance? A great many of our cases presented large marginal perforations with bare bone in the tympanum, yet were very successfully operated upon with good results. His own experience, based upon some sixty-odd modified radical operations, is that when one drains and permanently aerates the antrum region as shown and illustrated in the modified radical operation here described that cases of supposed middle ear necrosis will recover and become dry; he is convinced that the cause of chronic otorrhea in the vast majority of cases lies not in the middle ear, but in the antrum itself and when this region is once permanently aerated and drained the middle ear either completely recovers or greatly improves, no matter what its condition may have been prior to operation.

In regard to the indications for performing a modified radical operation Dr. Blackwell said he would consider the procedure in all cases of chronic otorrhea occurring particularly in young people, especially in those cases where the hearing was good and which had resisted treatment for a period of two or three months. He did not feel that the presence of cholesteatoma should constitute a contra-indication, as in most of the cases he had operated upon cholesteatoma was found and he had never been able to observe that the post-operative course of these patients differed materially from others in which no cholesteatoma was present.

In regard to the hearing following a modified radical, Dr. Blackwell said he was convinced that in the average case it is much better than it would be were a radical performed, and while this may not be true as concerns one or possibly two of the cases presented this evening, yet he feels confident that the other ten or eleven bear out this contention and he called upon the members of the Section to witness this fact.

Three of the cases presented tonight were those in which double modified radicals were performed over six years ago and for a number of years have been engaged in earning their livelihoods in vocations, *e. g.*, private secretaries, salesmen, etc. He would like to ask the

members of the Section if they knew of any instances where double radical operations had been performed and the patient subsequently able to earn his livelihood in similar vocations where acute hearing was so essential.

It rarely occurs that an otologist performs a double radical operation. It is so unusual to do so that the author does not recall at the moment an instance of this kind. Surely this reluctance on the part of otologists to perform a double radical does not lie in the scarcity of cases of double O.M.P.C., but rather in the fear justly held of causing subsequently great loss of hearing. In none of the cases of double modified radical which the author has performed has this followed; on the contrary, the patients have all felt that subsequent to the operation the hearing was improved.

He believes that otologists should consider as chronic mastoiditis cases of O.M.P.C. which resist treatment over a period of two or three months if there is an odorous discharge present. Observed from this standpoint the logical procedure to preserve the hearing would be to perform a modified radical operation, as by so doing we remove the focus of disease, namely, the antrum, and at the same time preserve the middle ear structures essential to hearing.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

February 26, 1925.

Rhinological Phases of Asthma. Dr. Burton Haseltine.

The conception of asthma: the clinical phenomenon known as bronchospasm, consists essentially of a spasm of the musculature of the small bronchioles. Accepting this definition, in its essential designation a spasm is an exaggeration, prolongation, or other modification of a normal reflex. This means that it is primarily an affair of the nervous system and is functional rather than structural in its inception. This point is of the utmost importance, as it means that a functional disturbance precedes any structural change; hence, all examination of any pathological tissue, ante- or post-mortem, is the study of a result, not a cause.

If a spasm is the result of a normal reflex, then the structures necessary for its production are the same as for the production of the reflex, namely, a peripheral sensory organ, an afferent nerve, a central nucleus or nuclei, an efferent nerve, and an end-organ, such as a muscle fibre, in which the final result is manifested. It must be remembered that the sensory receiving structure is often anatomically remote from the muscle or other organ in which the final result is shown.

The conditions which may produce this exaggeration of a normal reflex or spasm are: 1, the acute or chronic exposure of the central nervous system to the action of a poison (toxin); this poison may be exogenous or endogenous, single or multiple, bacterial or non-bacterial; 2, an abnormally irritable peripheral sensory organ. In the particular spasm known as an attack of bronchial asthma, the two producing factors are: 1, a highly toxic condition, chronic in nature, vaguely recognized under various names, but present in all cases; 2, an abnormally irritable peripheral sensory organ, which in this case is the ethmoid area of the nose.

For a clear understanding of this concept, one must distinguish between the term asthma and bronchospasm. Asthma is neither a symptom nor a disease, but is an abnormal bodily state manifested by various symptoms, such as urticaria, eczemas, eosinophilia, cyclic vomiting, protein or non-protein sensitization, disturbed calcium or endocrine metabolism, hyperesthetic rhinitis, angio-neurotic edema, acidemia, mucous membrane hyperesthesia (hay-fever), to which may or may not be added bronchospasm, which is now recognized as only the climax to

a rather definite sequence of abnormal manifestations. It occurs only when general toxicity reaches a certain stage and when ethmoid irrigation becomes sufficient to incite the spasm. The asthmatic patient is in a constant state of delicate balance between absorption and elimination; anything that helps to throw the balance the right way will relieve him; anything throwing it the wrong way will increase his distress. The asthmatic patient has an abnormal ethmoid; anything that lessens ethmoid pathology will relieve him; anything that increases ethmoid pathology will increase his distress.

The reflex arc which makes this spasm possible is formed by the connection between the trigeminal sensory nucleus and the nucleus ambiguus and the dorsal nucleus of the ascending vagus root. This reference to any text-book on the anatomy of the central nervous system. It is through this arc that is produced the sneeze or cough from irritation of the ethmoid, and it is probable that by this same mechanism is produced the wave of contraction that has been shown to occur on normal respiration. These reflexes appear to be the physiological analogue of the bronchospasm. It is not an accident that the rhinologist has gone farther than the pathologist in the solution of this problem. By a combination of circumstances readily understood, it is a clinical fact that the ethmoid labyrinth may be and frequently is both the source of toxic absorption (or one of its sources) and the exciting end organ. The importance of the rhinologist's role in asthma is thus apparent and it becomes clearly defined. This is a distinctly new and highly significant addition to our knowledge of the subject.

The author then discusses in detail the various phases of the toxic state and of the rhinological phases of asthma, emphasizes the value of the Dowling method of treating nasal infections, which differs from all others in that it is not a surface treatment, and explains wherein his own practice differs slightly from that of Dowling. He summarizes the whole subject by stating that those cases of ethmoid disease with retention of discharges, swelling and edema from blocking of natural drainage where not extensive tissue changes within the cells is present, are curable by whatever surgery will unblock the natural drainage, followed by Dowling treatments, with no opening of the cells whatever. It is chiefly in cases of this type that partial operations are reported as successful. Cases of extensive necrotic or polypoid changes within the labyrinth are not amenable to any extra-ethmoid procedure, and any operation short of complete extirpation is almost certain to end in disappointment.

DISCUSSION.

DR. J. IVIMEY DOWLING: The rhinological phases of asthma have always been considered important, but it has been left for the essayist of the evening to present the most likely explanation which seems to be borne out by results obtained through the treatment and methods Haseltine advises.

The discussion of asthma is a broad subject and the nasal element is only one of several items recognized by Haseltine to be considered in the treatment, however, it seems to be proven that there can be no without ethmoid pathology.

Haseltine has stated in axiomatic manner two facts necessary to comprehend and accept before anyone can hope to treat asthma successfully.

The primary axiom is "The fundamental basis of our conception (Haseltine and LaForge) is that asthma is dependent upon two factors, toxemia and ethmoid irritation, the first of which is unrelated to the nose."

The second axiom is exclusive of thoracic pathology. "Asthma is curable in direct proportion to the completeness and permanency with which one can accomplish two things, remove all sources of toxic absorption and restore normal physiology."

To those of us who have witnessed results in the treatment of asthma after the manner directed by Haseltine and LaForge it is easy for us to believe that no true normal physiology can exist in the presence of

infected ethmoids. Therefore, it is essential to follow some general method that will overcome and control the effect of ethmoid infections.

The methods resolve themselves into surgical procedures and medical treatment directed to the ethmoid area.

To study the living pathology of the ethmoid area I now resort to an *exploratory submucous resection*, irrespective of the nature of the septum, be it straight, deflected or merely ridged, providing that the middle and superior meati are obstructed by narrow nasal chambers or because of large cystic turbinated bodies.

A high submucous resection having been performed, it then is possible to push the flaccid septum to one side, thereby permitting study of the turbinated bodies and the cells beneath the scrolls.

The living ethmoid pathology may be divided into three classes: first, ethmoid bodies about equal in size, but anteriorly cystic and beneath these scrolls irregularly ridged cells from which oozes jelly-like mucus.

Second, high deflection to right or left, large cystic turbinated body on the one side and flat turbinated body on the other side, both bodies being easily infracted and readily pushed aside, permitting study of the ethmoid labyrinth beneath. In this type also jelly-like mucus oozes on displacement of the turbinated bodies.

The third type is in the extremely narrow nose with fairly straight septum beneath which will be found thin turbinated bodies adherent to the ethmoid cells beneath. In this type also will be observed the jelly-like mucus.

The aforesaid statements are true of the hyperplastic type of diseases in which the patients will usually state that they have never suffered with nasal catarrh. It is these types of ethmoid pathology that I have found are generally overlooked and they cannot be satisfactorily recognized nor studied without a high exploratory submucous resection.

My further surgical procedure in these types is to perform complete middle turbinectomies on both sides, either with aid of scissors and snare or the modified Ballenger angled knife, then make a single bite into each bulla cell and a single bite in some posterior ethmoid cell. Subsequently after a period of two or three months the underlying ethmoid cells will have enlarged until it is sometimes difficult to determine just how much erectile tissue and mucous membrane has been removed.

The progressive ethmoid pathology having been controlled, further ethmoid surgery may be instituted if necessary.

The remedial method of treating ethmoid diseases is best accomplished by the method now known as the Dowling treatment. I believe this after many years of clinical research and successful accomplishments, many accept this as true; more will, as they become familiar with the method.

Repetition would weary you and so a single instance will suffice: I therefore present the following notes, with permission. Miss E., age 60 years; "in the spring of 1895, in Washington, D. C., I was sick in bed for a few days with a heavy cold. A sharp pain was felt over the right eye, an abscess developed and finally broke, discharging through the nostril. I was sent North for the summer and told to spend half the time by the sea and half in the mountains. I felt better and stayed North permanently. For two or three years after this I felt a "spot" where the abscess had been. Soon after this the night air, moisture in the air during the day, talking in the outdoor air, laughing even in a dry warm room, would immediately produce asthma. For several years I would sleep for two or three hours each night, then regularly an attack of asthma would come on and I would be obliged to sit in a chair for an hour or more and found relief inhaling the smoke from steamonium leaves and saltpetre.

During this time a physician swabbed my throat and nose once a week; this gave temporary relief, but did no permanent good. About four years ago I was given argyrol packs in both nostrils. The coughing in the street from moisture in the air and the attacks of asthma in the night stopped immediately."

In closing let me emphasize the best results in chronic cases can only be obtained by hospitalization over a period of weeks or months. The rhinologist must co-operate with the internist and sometimes success is only obtained after aid given by the general surgeon.

DISCUSSION.

DR. REGINALD BURBANK (by invitation) confined his remarks to the purely bacteriological aspect of the subject. He said that he had not personally treated a large series of these cases, only about fifty all told, and many of them were chronic infective arthritis with associated asthmatic symptoms. The association of bronchial asthma with arthritis he had found mentioned first by Rolando in 1603, and subsequently by numerous other clinicians before the nineteenth century. In the work Dr. Burbank has been doing, asthmatic cases have been studied chiefly by cultural methods and by active serum complement fixation tests. The cultures are taken from the sinuses, the tonsils and from the sputum. It is his belief that the chest itself becomes a focus of infection in such cases and the preponderant organisms found were streptococcus hemolyticus and staphylococcus aureus. Streptococcus viridans were present in a certain number of cases, but do not seem to be the main causative factor in the production of infective asthmatic conditions. These cultural results were checked by control complement fixation tests and streptococcus hemolyticus and staphylococcus aureus deviations agreed in each case with the cultural findings.

Dr. Haseltine's results are brought about by the right methods from the bacteriological point of view for it seems more than probable that all infections are primarily allowed to gain headway in the body by a lowered resistance and a toxic condition as the basis of the lack of immunity. The surest way to clear up any infective condition is to build the patient's resistance up by eliminating toxic products and providing for a quick and thorough elimination of waste.

Dr. Burbank said that he had worked on this subject purely from the basis of infection and used vaccines as a treatment. Some of the cases cleared up with very few injections others, those with low vitality, were slow in response and a few cases did not improve at all. One case which had been of twenty years duration and had had all types of treatment previously cleared up entirely under vaccine of autogenous and complement-fixing strains and has had no attacks for the past seven years. In this case two series of injections were given. The first series was made from a staphylococcus viridans a rather unusual organism that grows like a streptococcus viridans on a blood plate, but at the end of thirty-six hours the blood plate is cleanly hemolized. Under the microscope it is a staphylococcus. The second series was made from the streptococcus hemolyticus and staphylococcus aureus.

The urine examination of these cases is important for it is very rare to find one of these asthmatics without increased putrefactive products in the urine. There are certain cases that will clear up on improving the patient's general condition, eliminating waste products and preventing an accumulation of "clinkers". Other cases would not improve until anti-bodies were formed capable of taking care of the bacterial invaders and some few would not improve under any method he had tried. Not being a rhinologist he had no personal experience with the colloidal silver applications as bactericidal agents for the sinuses, but he felt that vaccine treatment properly administered would be a useful adjunct.

DR. WILLIAM S. THOMAS said that Dr. Haseltine had brought with him a refreshing breeze from our sister city on the lake, and if his championship of the Dowling tampon treatment of asthma proved successful he would be hailed as a public benefactor. In the asthma work at St. Luke's Hospital, they leaned heavily on the rhinologist and doubtless, as time passed, more cases would be treated with the Dowling tampons.

Dr. Haseltine had said that every asthmatic case is a rhinologic case and that no case can be cured without the rhinologist's aid. That, however, seemed to Dr. Thomas to be an extreme statement. At St. Luke's

Hospital a great many patients had been successfully treated for asthma without any rhinological measures beyond examination. Dr. Haseltine cited as one evidence of the rhinologic etiology of asthma, the fact that attacks of bronchospasm are readily relieved by nasal sprays of cocaine. It should not be forgotten that cocaine was central in its effect and would have the same effect if taken by mouth, or by rectum or bronchial insufflation.

Dr. Thomas said that a detailed statement of Dr. Haseltine's results of treatment of asthma was to be desired, and it was hoped that he would publish them—good and bad together.

Many specialists classify asthmatics into sensitive and non-sensitive cases, according to the results of their protein skin tests, but Dr. Thomas held that all asthmatic patients were sensitive to something or other. If it was not to air-borne substances such as animal danders or pollens, or to foods or drugs, then the patients would be found, when properly tested, to be sensitive to the proteins of those bacteria that they harbored in their bodies. Dr. Thomas' cases of bacterial asthma were treated by autogenous vaccines, administered according to the results of skin tests with those very same vaccines. When the skin reactions were positive, the vaccines that caused the said positive reactions were used for hypodermic treatment in properly graduated doses, with results that would be stated in a few moments by Dr. Touart.

There was a class of asthmatic seizures, continued Dr. Thomas, that seemed to be far away from the hard and fast classification of Dr. Haseltine. These were the so-called non-specific attacks. These are the cases that follow a violent fit of laughter, or chilling of the body surface, or emotional stress such as anger or fear. Every physician has seen such patients; they need not be toxic nor rhinologic in origin. Again, take the case of Mrs. B. and her daughter, two healthy, buxom women, both sensitive to horse hair and suffering from asthma on approaching a horse. After desensitizing treatment last spring, they both went to a western ranch and rode horseback all summer without any asthmatic symptoms. Their treatment was not rhinologic nor is there evidence of their being toxic.

Focal infections constitute one of the serious problems of those who attempt to treat asthmatic patients. Not only may the focus of infection be in the ethmoid cells, but, as is well known, it may also exist in the other paranasal sinuses, in infected tooth-roots, in the prostate, gall-bladder, intestines, tonsils and in the bronchial tubes themselves. Before treatment of these infected cases can be successful, there must first be free drainage established. Then autogenous vaccine treatment, properly conducted, offers a high percentage of cases relieved. About a year ago, on this spot, New York's most eminent asthma specialist made the statement that until some method was found to enable us to treat successfully infected cases of asthma (that is, the bacterial cases) successfully, we were wandering in the dark. A long step in treating these infected cases has been taken by treating them with autogenous vaccines according to the skin test indications and after surgical drainage, if needed.

After all was said and done, Dr. Thomas felt that the rhinologic aspect of asthma was but one of its many aspects. But inasmuch as Dr. Haseltine had made progress in clearing up certain of the causative infections, hearty thanks were due to him.

DR. M. DE M. TOUART said that for a number of years he had been greatly interested in the subject of asthma and had tried many methods, finding that no set method existed to govern the individual case. He quite agreed with the Doctor's statement that the toxic load must be diminished before one can use the method with success, and any internist treating any chronic cases would have to admit the same thing. Before one can use any specific measure, the ground must be prepared.

There were several questions in regard to the reflex arc that works between the nose and the bronchial tubes on which he would like some enlightenment from Dr. Haseltine. As he understood it, the Doctor's

conception was that there is an irritable centre, irritated by toxins and an irritable peripheral end organ, such as the ethmoid cells, and that because of these two conditions we have asthma. Is it not possible that the visceral end of the arc might also be the excessively irritable portion? It has been clearly demonstrated that in sensitized animals the smooth muscle tissue throughout the body is in a state of excessive sensibility; it will contract excessively in response to contact with the protein or other substances to which it is sensitized. Consequently, in the sensitized individual the bronchial musculature is excessively irritable and will therefore react excessively to a normal impulse travelling over this reflex arc. Therefore, are there not two sides to this reflex arc question?

Dr. Touart said he had seen a considerable number of asthmatics without ethmoid pathology. He had seen a number of infants with most violent asthma and no nasal pathology, who had been entirely relieved by the removal of the cause, which in their cases was almost always in the food. Not only were they relieved of the asthma, but they were well otherwise. Therefore it would be very interesting to know whether Dr. Haseltine did not think it possible for an asthmatic to have asthma without such pathology; might not the cause lie in the irritability of the visceral end rather than in the other, and might not that be due to the sensitivity to protein or other foreign substances? Also, it seemed to him that there are many patients with ethmoid pathology who have no asthma, who have the two essential conditions, the diseased ethmoid and the toxic conditions, but no asthma. Why does not the arc work in that patient?

All who are engaged in the treatment of these chronic cases ought to be careful not to take extreme opinions, but to take a position near the centre where they can get the best out of both sides and use it to the best advantage. The results from the cases treated at St. Luke's Hospital, published in the Archives of Internal Medicine in July, 1924, showed 62 cases treated with autogenous vaccines. They were selected, in that they had not been helped by other methods of treatment, and in the hospital were not treated other than by means of these vaccines. Out of 62 cases, 32 were completely relieved, and 14 cases were practically relieved; in other words, 74 per cent of good results. After two and a half years of this clinic, 97 cases have been treated in this manner: 23 of them have remained practically well for one to six months; 21, 6 to 12 months; 20, 1 to 2 years; 4, 2 years or over.

Dr. Touart said it might appear rather ungracious to seem to attack Dr. Haseltine's subject, but after working on this question for many years he did not like to give up the idea of sensitization being a very important factor in asthma.

DR. JOHN MCCOY said that the subject had been pretty well covered and reviewed by the various speakers. Dr. Haseltine had been kind enough to give him opportunity to familiarize himself with the substance of the paper and to look up these apparently revolutionary ideas in regard to asthma, the revolutionary part of it being due to the claim that asthma was always due to ethmoid pathology, and being occasioned by a reflex arc going from the 5th to the 9th and 10th nerves. Dr. McCoy said he had taken occasion to look up these nerve perambulations himself and also in connection with a neurologist, but they had been unable to find any connection between the 5th and the 9th and the vagus nerves, etc.

The members of the Section were greatly indebted to Dr. Haseltine for bringing forward this subject of detoxication. He thinks the specialist is more likely to think of detoxicating a patient than the general practitioner. It has come in a general way to be known that the rhinologist can relieve asthma, and Dr. Haseltine scored a strong point when he said that one should never forget the importance of eliminating the foci of infection. In one extreme case where the patient was developing colds all the time, he was finally relieved of a fistula in ano and immediately his colds ceased. Dr. Haseltine assumed two indispensable

elements: one of them, ethmoid pathology; and the other, toxemia. If one or the other fails, his theory would seem to fall down.

In going over the cases treated, Dr. McCoy has met such types as these: those that have a nasal condition only; he has operated on cases with frontal sinus and ethmoid disease, with absolute relief to the patient; and he has operated on antra with absolute relief, so that it would seem that in nasal types such treatment is most hopeful. He has also operated on nasal types with indications of intoxication. In one instance a radical operation was performed on both sides and the patient's nose trouble cleared up completely, and apparently his asthma also disappeared, but at the end of nine months he returned, stating that his asthma was as bad as ever. An internist then treated him and relieved the toxicity, but it came back, etc. Dr. McCoy said that such experiences made him rather question Dr. Haseltine's theory, as did also the cases related by the previous speakers with allergy, where nothing but desensitization seemed to cure the asthma. Other cases he had referred to the medical men, who found a myocarditis, and with rest in bed for a few weeks, and digitalis, they cured the asthma.

It would seem that we are constantly having influences pass from all parts of the body to the vagus and even from the emotional centers. We know how fear will cause the heart to go more rapidly. So that many of these patients are affected other than by the arc of which Dr. Haseltine spoke.

Dr. Haseltine had stressed the Dowling tampon. That is a very valuable method, and has given as good results as any non-surgical method. It has an unquestioned place in our armamentarium.

DR. HARRIS A. HOUGHTON said that while Dr. Haseltine did not need any assistance from him in defending the theses which he had presented, the speaker felt that some of those who had discussed the paper were not entirely fair in presenting Dr. Haseltine's position. "I am myself in hearty accord with the main premises, in that he believes that bronchial asthma has a fundament in two distinguishable conditions, *viz.*, allergy and bacterial intoxication. His views fit exactly with my own experiences in studying the chemistry of the blood of asthmatics. Many of them have sufficient degree of nitrogen retention to warrant regarding them as nephritic. This may be accompanied by a considerable degree of myocarditis, or the myocarditis may exist independently without the nephritis. It would be hopeless to try and relieve such patients without appropriate metabolic treatment, or treatment directed towards the damaged myocardium.

"In presenting the blood chemistry examinations of some asthmatics at the November meeting of this Section, I showed that a characteristic of long-standing asthma was a supersalinity of the plasma. The intoxicating substance in this combination is the sodium, and to it may undoubtedly be traced a part of the hypersensibility of the nervous system, which in turn is responsible for the excessive nervous reactions described by Dr. Haseltine as a *sint qua non* of the asthmatic state. There is also excessive bronchial secretion, and a dropical mucosa of the bronchial tree. This might well be a localized dropsy due to chemical reactions of sodium in the bronchi in exactly the same way that the blood vessels of the legs are rendered permeable to water in well-recognized salt dropsy. Most of these old asthmatics have a moderately high blood pressure. All of these coexisting conditions call for a diet low in sodium chlorid, and in those bases which according to Ambard have the peculiarity of acting as a substitute for sodium in the body chemistry. The diet therefore should be one low in sodium, rather than expressed as a diet low in sodium chlorid.

"About 25 per cent of our old asthmatics have a high blood sugar. Many of these are what we call concealed diabetics, *i. e.*, they have a high blood sugar and no sugar in the urine. The only way to make a diagnosis is to do routine blood chemistry examinations, and no matter what is done to the nose, or with vaccines, or in dieting, there will be many failures in treatment if this incidence of high blood sugar is neglected.

"Outside of the high blood sugars encountered, the deviations from the normal in blood chemistry are due to prolonged irritation of the kidney from focal infections, 90 per cent of which are found in the regions from the neck up. In treating asthma, one can break into the vicious cycle anywhere and get some results. Removal of the infected tonsils will decrease intoxication, relieve strain upon the kidney, and tend to improve ethmoiditis. That may be all that is necessary to do for temporary relief. The same result will follow ethmoid eventeration without removal of the tonsils, and will also reduce the local susceptibility in the ethmoidal region of the nose. Temporary or even permanent relief may follow. The same may be said of draining an infected sphenoid sinus or washing out the antra. One may treat any of these infected conditions without surgery and with vaccines, and get some kind of results other than negative, notwithstanding the fact that it is clearly unscientific. By the use of vaccines, the vicious cycle is broken into.

"Furthermore, one may vaccinate against foreign protein and attack the allurgical segment of the problem. The vicious cycle is again broken into, and temporary relief may or may not follow. As a metabolic, I may attack the cycle from my point of view, correcting the results of the prolonged infection by diet—and this is purely symptomatic treatment—and also get results, temporary at least. I have done it many, many times. But I would as well think of stopping the asthma by smoking cubebs, as I would to try and cure without the aid of the nose and throat surgeon, who, in old asthmatics will always find pus and plenty of it, above the neck. If you would cure your patient each individual case must be investigated along all of these lines, and must be treated along all lines, and treated very skillfully. In proportion to the skill used and in proportion to the breadth of vision in discovering links in the etiology, in that proportion will the percentage of cures increase, and permanency obtain.

There is no cheap or easy route in curing asthma. The longest and the hardest roadway is the one to follow, and patience is the highest of virtues.

DR. L. M. HURP said that one would see several hundred cases of ethmoiditis before he would see one in relation to asthma. He believed that the number of asthma cases due to the nose were in the minority; that most of the cases were due to foreign proteins, either ingested or inhaled, and in those cases in which the nose was a causative factor, he had always found a micro-organism in the nose and that patients were sensitized to it the same as they are to foreign proteins to which they are sensitized, such as pollen, horse dander, etc.

Operation upon the ethmoids will relieve and cure asthma in so much that it affords drainage and gives the patient an opportunity to rid himself of the micro-organisms to which he is sensitized.

DR. Haseltine spoke of Dr. Adams' book on asthma, published in 1913, which I read in that year and seems to be of the same trend as that in which Dr. Haseltine is now talking.

DR. N. L. WILSON asked that Dr. Haseltine tell what experiments had been made to show the bactericidal action of argyrol and its osmotic action on mucous membranes. Many of those present who knew Dr. Ballenger would remember the "vicious circle" and his speaking of this same thing some twenty years ago, so there was evidently something in the theory. There was also something in Dr. Dowling's tampons; but in going about and seeing men with patients in their offices waiting with tampons in their noses, it seemed to him that we are getting to be empiricists; treat only the cases that actually need it and leave the others alone.

DR. MARIE J. GOTTLIEB said he had listened with a great deal of interest to Dr. Haseltine. He had just been looking over some statistics on the subject of the relation of nasal disease to asthma, and in a very carefully selected list of 160 cases where the nose was studied carefully for the presence of disease, he had found that in this series there were

only 31 authentic cases of disease of the nose; so that it would seem that we are either missing something in our observations or there is something wrong in our technique, in observing or considering just what disease in the nose really means, if we assume Dr. Haseltine to be correct.

He did not believe that it was possible for a doctor who is treating asthma to make a definite statement as to the length of time or as to a cure. It is not practicable to observe these cases long enough, or if it is done they may relapse after a number of years. It would be much better to speak of the absence of symptoms for a number of years. Also, no treatment can be stereotyped. Each patient must be considered individually and treated accordingly.

DR. JOSEPH HARKAVY expressed interest in the various views presented, but asked for further information: 1, as to what was the toxic condition and 2, what the pathological findings of the nose were in the cases of asthma under discussion. He said that in the asthma clinic at Mount Sinai Hospital, where a large number of asthmatics were treated, every case of asthma had a rhinological examination, and many of these were operated on from time to time to eliminate foci of infection which played a possible etiological role in the asthmatic attacks.

He had no wish to minimize the importance of such procedure in those cases who had definite sinus infection, where the evacuation of pus and drainage promptly relieved the asthma. Unfortunately, however, in their experience the majority of the asthma cases who have concomitant nasal symptoms have such as the result of irritative factors operating within their particular environment. It must be borne in mind that a patient with true bronchial asthma may be said to have an "asthmatic constitution", which, although a poor term, expresses the idea that such a person differs from the normal individual because of his peculiar sensitiveness to a multitude of substances that may fall either in the inhalant group, such as dust, pollen, feathers or foods, or bacteria, etc.

The relief or the removal of any one group responsible for a current attack does not necessarily protect him from other new etiologic factors, and that is due to his constitutional makeup.

Still another point should not be forgotten, and that is that a patient with true bronchial asthma may have diabetes, nephritis or tuberculosis, which have nothing to do with his attacks. These are independent states and the blood findings expressive of the first two conditions are not to be attributed to the bronchial asthma.

DR. HASELTINE said the discussion had reassured him on two points about which he had had misgivings: He had doubted whether he could bring to this Section anything new or interesting. The interest had been shown by the very generous discussion, while the newness was evidenced by the polite incredulity expressed. It was highly significant that the incredulity was shown by those to whom the ideas were new, while those who had seen the results of their application expressed only favorable opinion. This has been the unvarying sequence of reactions following the presentation of this subject to numerous medical societies during the past five years.

To those who are satisfied with the results of vaccines, serums, or antigens in the treatment of asthma he had nothing to suggest. To those who are disappointed with these results he suggests a method which seems to meet the problem with much greater success and especially in those cases where vaccines and serums have completely failed. He has here many case reports bearing upon all phases mentioned in the discussion, some reports covering a period of fifteen years, which it would be interesting to read did time permit.

Answering Dr. Touart's question, "Does not the peripheral stimulus for the spasm come from the gastro-intestinal tract?" If so, why is it promptly stopped by cocaineization of the nose?

Dr. Thomas has said that cocaine would have the same effect taken by mouth or rectum. This statement is entirely erroneous. More than

that, it is a highly dangerous error. In all operations upon asthmatics special precaution is necessary to prevent cocaine from entering the stomach or otherwise reaching the general circulation because the resulting cardiac depression predisposes to an attack and adds a serious complication when it occurs.

Dr. Haseltine was frankly astonished at Dr. McCoy and the so-called neurologist. It is not "revolutionary" to refer to known facts. The connection between the descending trigeminal root and the vagus nucleus is common knowledge. (Edinger, Barker, Ranson, Epplinger and Hess, Gordon Wilson, McLaren Thompson.) The chart here shown is from Ranson's Anatomy of the Nervous System, which describes the connection in detail. It is true that Dr. Haseltine in 1911 first suggested this as the explanation for the nasal reflex, but he did not discover the anatomy nor invent it.

He was grateful to Dr. Gottlieb for mentioning his method of reporting cases. Those who have read his articles will recall that Dr. Haseltine never reports a case as "cured", but gives dates when treatment was terminated and length of time patient remained symptom free.

He thanked the various speaker for their generous discussions and for the many valuable points brought out.

SECTION ON OTOTOLOGY.

March 13, 1925.

Paper: Discussion of Clinical Problems of Chronic Suppurative Otitis Media. Dr. George E. Shambaugh (by invitation).

DISCUSSION.

DR. JOHN MCCOY said that the author whom we like best is the one who expresses our own thoughts better than we can do it, and Dr. Shambaugh had just done that for him. To take up the various points presented would simply be to emphasize them. For seven or eight years he has not himself operated on a deviated septum for the purpose of relieving an ear condition, but only operates on the septum for the relief of nasal obstruction. He did not know that he had ever seen a case of complete atresia with a perfect ear, but no doubt that was possible.

Dr. McCoy said that he, too, like Dr. Shambaugh, had had twenty-five years of experience as a specialist, and he has come to feel that individuals, like societies and nations, have opinions and change them, and perhaps change back again later. His first impression in treating ears was that 99 per cent of chronic ears should be treated conservatively; then, seeing the bad results, he changed his ideas and commenced to think it best to try a moderate degree of conservatism and if that failed to resort to the radical operation; but gradually he formulated in his mind the conclusions which Dr. Shambaugh had so beautifully pointed out regarding bone invading processes. But a number of these cases come very close on the border line and many of them are seen in consultation, and the question comes up whether or not to operate. Dr. McCoy said he sees cases that have been conservatively treated, where the patient comes to him with a facial paralysis; and others that have been treated conservatively yet have established labyrinthine involvement, and from the number of these that he has seen he is now inclined to the radical side. He balances the question, as Dr. Shambaugh had pointed out, but rather leans toward the radical side and would remove the necrotic bone near the dura; for he has never seen a bad result from a radical operation in such cases, but has seen a number of bad results from neglect to do it. It is certainly up to the profession to consider carefully the points brought out by Dr. Shambaugh.

Dr. McCoy, in conclusion, said that he would differ, however, with Dr. Shambaugh in regard to operating on the labyrinth in cases of acute suppuration of the middle ear. It has been his experience, even though the function is completely gone, not to touch the labyrinth. He said that a large majority of these cases following acute infection of the middle ear, will get well through simple drainage of the ear or mastoid. That was a point on which he differed, if he had understood correctly. He then asked Dr. Shambaugh's opinion in regard to X-ray examination of these chronic mastoids. How much value does he place on them? Also, what is his opinion of the spinal tap; should it, or should it not be done? In his own experience, it makes a great deal of difference in deciding whether or not the labyrinth should be opened.

DR. LEDERMAN expressed his appreciation of the value of Dr. Shambaugh's address, and said he would like to offer a few observations from his own experience. Referring to the subject of infection of the middle ear, he told of a recent case, a child which was admitted to his service with a condition of nephritis and an acutely involved middle ear. The child had been sent in for operation, and on examination, he decided to simply excise the drum and keep the patient under observation. In his opinion it was a question whether the invasion of the kidneys was secondary, or was concomitant with the condition of the middle ear involvement, and one could not at a single examination decide the facts. The case was watched for two weeks, and although it required the exercise of a good deal of masterly inactivity to keep from operating, it was noted that as the process in the middle ear subsided the kidneys improved, and ultimately the child recovered without a mastoid operation, and the kidneys cleared up. In regard to the hearing: in these cases of chronically diseased ears, all have had the experience of being told by a patient that the hearing was much better when the ear was moist than when it was dry.

The pathognomonic symptom of bone invasion, the characteristic odor, is not always an indication that an operation should be performed. In one instance, a professional man had been troubled with a chronic ear for thirty-five years, and was advised by several eminent specialists of this city to have the radical operation done. He was very loath to agree to those, as he could get no opinion as to whether or not he would lose his hearing, and so he decided to follow a conservative line of treatment.

On examination a very large perforation was observed, involving the posterior half of the drum, with polypi in the attic region. These growths were removed and after about two months of regular conservative treatment with a special iodin powder (Salzberger) he got well to such an extent that not only did the suppuration cease but the drum healed over. When first seen, this patient heard the whispered voice at only three feet, but at the end of the treatment he heard the whisper at 12 to 14 feet.

In another case, a woman had suffered from a prolonged suppuration of more than thirty years' duration. When examined, the ear was apparently dry but, on removing a scab, pus and cholesteatoma were revealed, involving the inner portion of the auditory meatus and middle ear: The membrana tympani and ossicles were affected. A considerable quantity of cholesteatoma was removed. She had also some labyrinthine symptoms, saying that the floor seemed to be coming up under her, and vertiginous attacks. Under conservative dry treatment with the powder just mentioned, the suppuration has ceased and her vertigo has markedly improved. If ever any cases seemed to demand operation these did, yet in both patients the active suppurative process has been cured without surgical intervention and good hearing has been retained.

In another instance, a young girl, age 15 years, was admitted to the medical service of Lebanon Hospital with the symptoms of high temperature, chills, headache, and nose bleed, and a tentative diagnosis of typhoid fever was made. On routine examination she was found to be

three months pregnant, and immediately associated with this fact was the thought that she had attempted some method of abortion. Further investigation found no sepsis in the uterus or adjacent parts, but one day a foul discharge from the ear was noted, so an otological examination was requested. This resulted in a diagnosis of sinus thrombosis. The patient was operated upon the next morning, and an infected lateral sinus and clot was found. The internal jugular was then ligated. She also had some chest symptoms, cough, etc., and later a lung abscess was found, but the surgeons thought it best not to operate. She aborted on the third day, and after a stormy convalescence with appropriate treatment of the various complications, she got entirely well and was later presented before this Section. Here was a case of chronic suppuration and no history of aural symptoms until the fulminating symptoms pointed to this organ.

Dr. Lederman said he was pleased to hear Dr. Shambaugh speak on the question of conservatism in treatment where both ears are involved. Formerly in cases of bilateral suppuration it was the question which ear should be operated upon, because the hearing was gone on both sides. In one case, that of a small child, the entire drum of one ear had been absorbed and the membrane of the other ear was thickened from previous suppuration, and yet the child heard better on the side where the drum was gone than on the other. Another aurist advised immediate operation lest some cerebral complication should develop. The large perforation was evidence that the drainage was good, and in this case also, under conservative dry treatment with the iodin powder the condition cleared up and the hearing was preserved. The question of hearing is a very important economic factor, said Dr. Lederman, and the older he grows the more conservative he becomes. Of late he has had numerous cases get well with the treatment mentioned carried out regularly and carefully.

He then told of the care of a girl, age 14 years, who had been in a hospital with pneumonia complicated by acute otitis suppurative and mastoid symptoms. Operation was indicated at the time, but owing to a bad heart it could not be attempted. When the case came under his observation three years later, there was a large perforation of the external auditory canal wall from the mastoid cells, which were filled with cholesteatoma and granulations. He advised a radical mastoid, but this the family refused. He therefore cleared it out as well as possible with a ring curette introduced through the spontaneous perforation, and after numerous cleanings of the mastoid cavity plus a course of dry treatment the girl made a good recovery, and up to the present time has had no further symptoms. The hearing has remained quite good. The middle ear, which was also involved and treated at the same time, has remained dry. Dr. Lederman said that he had had the opportunity of seeing this patient recently, six years after the dry treatment, and the ear and mastoid cavity are in good condition.

DR. NORTON WILSON said it was most refreshing to listen to Dr. Shambaugh, for they had known each other for twenty-five or thirty years and the Doctor was not always so conservative as he is now. It is a great advantage to be able to reap the benefit of the experience of a man who has studied his subject for twenty-five years and knows it so thoroughly.

The Doctor had spoken of the mucous membrane of the labyrinth as being more tough and protecting the labyrinth more than the bone, and had also spoken of the cholesteatoma invading the sinus. Is it not the fact that the sinus, too, has some protective elements?

DR. H. M. SCHEER asked the privilege of bringing before the Section, and especially before Dr. Shambaugh, a case now under his observation, stating the method of treatment adopted and asking for approval or criticism.

"The patient happens to be a physician, age 45 years, who called on the phone from Haverstraw on Tuesday evening, saying that he had had a bad cold for two weeks, and had had earache for four days, and

asking what to do to relieve the pain. I suggested that he see an otologist in the vicinity or come to New York to one, and in the meantime gave a prescription to relieve the pain. Not hearing from him the next day, I thought he was better, and later learned that at 5 o'clock that day an otologist looked at the ear, found some inflammation in the middle ear. On Thursday morning, at 2 o'clock, the Doctor's wife called up over the phone, saying that he was very sick, had a temperature of 102° was dizzy, and was beginning to feel nauseated. I said I suspected something more than an acute middle ear process, and that he should have immediate attention, or that she should bring him to New York in the morning. I saw him about 9 o'clock, and he had a lateral nystagmus to the right and fell to the left, and was greatly nauseated; he had a markedly bulging drum, all signs of labyrinthine involvement complicating an O.M.P.A., etc. I took him to the hospital and opened up the tympanic membrane under ethyl chlorid. The pus welled up, pure pus, filling the speculum. I put him to bed, and am keeping him absolutely quiet.

I take this opportunity of presenting this important case and feel that he will get help from Dr. Shambaugh. One of the men in consultation advised keeping the patient absolutely quiet, under narcotics if necessary, and avoiding all irrigation of the ear, simply drying it out, and if within the next few days the mastoid involvement (for there already were signs of involvement) necessitated interference, to operate on the mastoid and open it up with as little concussion as possible. The hearing is impaired, but not entirely gone.

I present the case for consultation.

DR. CHARLES GLUCK asked whether Dr. Shambaugh would consider a patient safe for the rest of his life from any intracranial or other complications, when the discharge is relieved and the drum completely dry, the odor gone, and the patient hears the watch tick and whispered voice at 12 to 15 feet?

DR. HUBBY said that he always enjoyed hearing Dr. Shambaugh, for he always learned something from him. Dr. McCoy had touched upon an important point. Two years ago the Section devoted an evening to the discussion of the indications for the labyrinth operation, and the consensus of opinion expressed seemed to be that it was best to leave the labyrinth alone, even when it was functionless, unless the cell count in the spinal fluid was increased; that one should watch the condition of the spinal fluid and if that grew worse to interfere, otherwise not.

DR. ISIDORE FRIESNER said that while undoubtedly the study of the cerebrospinal fluid is of value he does not think that any laboratory test alone should set the indications for operation. Furthermore, with regard to the question at issue between Dr. McCoy and Dr. Shambaugh as to whether a labyrinthitis complicating an acute otitis media should be operated upon, both were right, but were not talking about the same thing. An acute labyrinthitis, complicating acute otitis early usually gets well, but a labyrinthitis complicating a subacute mastoiditis will not get well as a rule. If there has been a mastoiditis with a deep-seated focus eroding the labyrinth, and that is the etiological factor causing the labyrinthitis, that is a very serious condition, for that is undoubtedly a diffuse suppurative labyrinthitis.

It was very gratifying to hear Dr. Shambaugh negative the idea of a clinical differentiation between serous and suppurative labyrinthitis. We have long heard of these two things which are not, strictly speaking, entities. Dr. Friesner said he does not believe that in its essence a serous labyrinthitis differs from a suppurative one. If there occur a moderate invasion of the internal ear, if bacteria cause a reaction in the tissues and fluids of the internal ear, we have learned to call this a serous labyrinthitis. True, there are no bacteria found there, but a great deal more severe invasion with the selfsame bacteria causes a suppurative labyrinthitis in the same way that the serous pleuritis is often a forerunner of a suppurative pleuritis. True, a serous labyrinthitis is often associated with the retention of some function in the

internal ear, but the retention of function does not necessarily mean that a serous labyrinthitis will remain a serous labyrinthitis. He does not believe that the condition can be differentiated clinically, and feels that the use of these terms is a misnomer. Long ago he had advised changing from the terms now in use to a mild as compared with a serious labyrinthitis.

DR. SHAMBAUGH, referring to Dr. Friesner's remarks on the differentiation between serous and suppurative labyrinthitis, said that what he had intended to say was that in these cases of serous labyrinthitis he does not go ahead and operate; if there is a suppurative labyrinthitis, he operates to establish drainage. He does not operate on a mastoid or a labyrinth unless the spinal fluid gives a clue that there is some menacing condition burrowing through.

As to the question of dry treatment, it is a very valuable method, and one should not lose sight of it, but washing out of the ear is not to be discarded for all cases. He could not agree that one should never use irrigation under any circumstances.

Replying to Dr. Scheer's inquiry regarding the physician suffering from an acute attack, Dr. Shambaugh said it is a dangerous thing to have an otitis run on for several days without drainage; that kind of change necessitates an operation; most of them will get well without operation, but where there is a mastoiditis with headache and pain, in many of these cases the drum membrane has not ruptured soon enough, and the patient has not had enough symptoms to send him to the doctor. He felt very strongly that he should leave this patient alone unless he shows signs of intracranial involvement, in which case he would operate quickly, or unless there was a mastoiditis which means that he has a bone disease, which indicates operation. Dr. Shambaugh said he makes a very clear distinction between these two things. Every case of pneumatic mastoid will have acute symptoms.

Dr. Shambaugh said he did not quite get the import of Dr. Gluck's question.

DR. GLUCK said he had had quite a series of these cases in which he gives them a clean nasal cavity and pharynx and the hearing improves, the odor disappears, and the watch tick can be heard at some distance. He had followed this course for some years and had had no complications.

DR. SHAMBAUGH said he would call that a coincidence rather than a fact.

Can one speak of a cholesteatoma breaking through the canal and clearing itself? All have seen such cases, where the patient has a chronic running ear and a big hole running up to the attic, and the appearance shows that a glacier has passed over it; when the glacier has swept over it the air gets in and the process of desquamation begins. Lack of air had increased the moisture. Many patients are seen who have had cholesteatoma who have not required surgical interference, for nature has thrown the space open, the air entered, and the process ceased. The same is true with regard to the carious processes. That does not necessarily mean that there is a dangerous process deeper within, but there may be a deeper-seated dangerous process.

With regard to the X-ray, Dr. Shambaugh said he does not usually get any assistance from it in regard to the diagnosis of chronic suppurative otitis media, but in the case of a running ear which has continued for five or six weeks, an acute otitis media with no mastoid symptoms, and no pain, a skiagraph is very valuable for the purpose of determining the size and location of a possible cavity.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

March 25, 1925.

Paper: **Synergistic Analgesia in Head Surgery with Special Reference to Novocain, Magnesium Sulphate and Morphin.** Dr. James J. King King.

(Published in full in the March, 1925, issue of THE LARYNGOSCOPE.)

DISCUSSION.

DR. VOISLAWSKY said he had visited the Hospital for the Ruptured and Crippled and had watched Dr. King's work, and it was most interesting to see his patients wide awake, so to speak, without seeing any injection of novocaine, but knowing that it had been injected beforehand. One of the patients was a great big fellow, and Dr. King very skillfully removed the tonsils and the man never batted an eye. It was a very successful anesthesia.

DR. KING said he had presented the subject for a record and had nothing to add at this time.

Replacement of Soft Palate (Abstract). Dr. J. Eastman Sheehan.

Dr. J. Eastman Sheehan described a procedure, as applied in the cases of three adult patients, for the replacement of the soft palate. All three were cases of total cleft-palate, which after several attempts at repair had been pronounced to be further inoperable. The method employed was to separate a layer of tissues from the adjacent palatal, tonsillar and pharyngeal areas; to swing these flaps up to where they could be joined along the palatal median line; and then to cover the denuded areas with Thiersch grafts, to avert the destruction of the newly-made palate which could be foreseen if contractures were set up in the process of healing if the Thiersch cover were not supplied.

The object of the procedures is to restore as much as possible the mechanism of speech, in regard to which the soft palate, in its relation with the pharynx, plays a part in the differentiation of sounds, as do the tongue, the teeth and the lips. In the enunciation of the nasal consonants (m, n, ng sounds) there is a slight movement of the palate towards the pharynx. It approaches that wall when the sounds of k, x, y, z are emitted. The orifice is closed altogether to admit of free transmission through the lips of the vowel sounds. In the absence of the soft palate incoherence of sound is inevitable and articulate speech impossible.

In the cases under review, attempts at repair through use of the tissues near the velar eminences had failed, and the opinion was that nothing more could be done.

On both sides of the pharynx, and extending forward into the mouth, there is a complex of muscles, most of which in their normal extension are inserted into and form part of the palate. Of these the most important are the palatopharyngeus, the palatoglossus, the salpingopharyngeus, the levator palati, and the tensor palati, each of which has a definite function in relation to the palate. Closely associated with them in position is the important superior constrictor muscle. In amongst them is the faecal tonsil. There is a reasonable expectation that if a velum can be formed from these muscles, their normal functions will be developed by use, both in and away from the velum. In the present instances this actually happened.

Incisions are made well above the superior horizontal line of the tonsil, carried downward well forward toward the cheek, then directly across the tonsil, to include its upper two-thirds, thence across the posterior pillar to include about a quarter-of-an-inch of the pharyngeal membrane, then up to a level with the original point of incision.

From the area thus outlined a strong flap is raised by deep separation, using long semi-curved scissors with blunt ends. The flaps are drawn up and sutured along the median line. Strong stay sutures are inserted. Beginning at the back, the needle enters about an eighth-of-an-inch back from the free membranous border and is carried back until a generous

portion of the muscular filaments which form the posterior pillar has been included. It is then brought out and carried to the opposite side, where the order is reversed, the needle first entering the muscles of the posterior pillar, thence forward to the membranous border and out. When the suture is tied the first stay of the new palate has been formed. The tonsillar materials are joined with three mattress sutures. Then the anterior area is stayed in the same way as the posterior. The membranes from front and back are now brought together underneath, a continuous surface thus being established.

These procedures are conducted under combined local and general anesthesia, with careful concern for the control of bleeding, especially in the tonsillar area.

Since the denuded areas cannot be left to epithelize, because of the destructive effect of the contractures certain to develop, they must be covered by Thiersch grafts. These are applied by the aid of moulded stents, held in place by a bar appliance attached to the teeth. The grafts are held in position for from eight to ten days, and for three days more no food is allowed to enter the mouth. Feeding during the whole period is through a duodenal tube of Einhorn, inserted through the nostril and passed down through the esophagus and stomach into the duodenum. The diet consists of 240 c.c. of milk, with one raw egg and 15 grammes of sugar of milk, well mixed and administered at blood temperature. The flow is sustained by use of a large glass syringe, every two hours from 8 a. m. to 8 p. m. Physiological salt solution is administered by the Murphy drip method per rectum, 350 c.c. in the morning and again late in the afternoon.

Pain for the first few days is controlled by doses of $\frac{1}{4}$ gr. codein sulphate, frequently given, allowed to dissolve under the tongue. The mouth is kept rigidly clean by frequent swabbing. A weak solution of potassium permanganate is recommended. Injection of a little magnesium usti through the tube is recommended if constipation develops.

For closure of the hard palate obturators were used in these cases, but full thickness skin grafts have been applied successfully and are certain to come more into use.

Patients should be recommended to an expert in speech training. The results are quicker and better than if they try to work out unaided a system of vocal production.

DISCUSSION.

DR. ROBERT IVY (by invitation) said that it was with great hesitation that he undertook to discuss Dr. Sheehan's paper, for he had had no experience whatever in this method, indeed very few have. He had come to hear what Dr. Sheehan had to say, and to learn all he could, rather than to take any part in the discussion.

A great many attempts have been made previous to this to supply tissue to fill in a defective soft palate. As Dr. Sheehan mentioned, skin has been taken from the outside surface, but there is no report in the literature where the tonsils have been used. Brophy, of Chicago, quite frequently uses the palato-pharyngeus muscle for lengthening the soft palate; that is his usual method and he claims to get very good results, but one could see that Dr. Sheehan's method might have advantages in certain cases over the Brophy method, for the latter cuts the muscle of the posterior pillar two-thirds through, and naturally the cut part is bound to contract to some extent; whereas Dr. Sheehan's method takes in not only the muscles of the pillars of the fauces but the superior constrictors and the tonsils between them, and gets tissue which is much less liable to contract. Therefore, while this work is new and untried to a certain extent, it should be kept in mind and given a thorough trial, and results reported. The main object to be striven for is the production of better function in the soft palate by getting longer and more flexible soft palates, for the main purpose is to have improvement in speech; unless there is a long, mobile soft palate there will not be any speech improvement, and the patients might just as well wear a mechanical appliance.

DR. HENRY SAGE DUNNING said it was very interesting to hear Dr. Sheehan bring out this new and fascinating subject. Last year he presented a method of epithelialization of the antrum, and this new operation, which as Dr. Ivy said has never been reported, is even more fascinating.

Dr. Dunning said he has had no experience at all in using the tonsil as Dr. Sheehan has done, though he understood it has been used a great deal in other ways, but this operation is absolutely new. When in Chicago last week attending a meeting of the American Association of Oral and Plastic Surgeons, he had talked with several men who have done a great deal of palate work. The West leads the East in this kind of work, and these men felt that it was a good thing to do the palate first and take the tonsils out if they could not be used. In many cases they took part of the tonsil out and sewed it in, and helped to fill out the soft palate, but they did not have any definite method like this. Dr. Sheehan's method was most interesting, but there were several points of particular interest. It would seem almost impossible to do it in a young child, as it would be very difficult to keep a young child quiet and to treat it by this method; and if it is not done in early youth it would seem almost impossible to get enough tissue to assure good function in later life. One might anatomically fill the palate out as he does, but whether you would get good functional results seems doubtful.

As for keeping the parts clean, and applying the splints with these clever arms that he has shown, and the difficulty of all the apparatus, it seems to me appalling, but it is most ingenious and both he and the Society are to be congratulated upon this original work.

Dr. Dunning then asked the age of the patients, and also whether Dr. Sheehan, in the case shown on the screen, used an obturator to obtain part of the function, or whether he relied entirely on the palate which he makes to attain his end. It would seem that he would have to use an obturator with tail piece to close off the nasopharynx, and would have to use one anteriorly to close off the cavity which he showed. It is a most interesting proposition, and we have all been trying to find some way to give an adequate and resilient long palate; and in a patient over 12 of 15 years of age it would seem almost impossible. The only time one could hope to do it would be in children under 1½ to 2 years of age; but after 5 years of age, it is hard to see how he can get the function.

DR. HAROLD S. VAUGHAN said he had had the privilege of seeing one of Dr. Sheehan's cases very shortly after union was obtained, and was very much impressed by the appearance of the palate. It is a unique operation, and Dr. Sheehan is to be congratulated on the results obtained. It seemed, however, to be limited mainly to adults. Many cleft-palates are seen that have been operated upon several times; there is one redeeming feature in some of the failures; it is that hypertrophy of the palatopharyngeus and palatoglossus muscles often occurs, making it possible to obtain enough tissue to close the defect by surgery.

Dr. Vaughan then said he had just shown three cases where he had used the posterior and anterior pillars for repair in cases otherwise inoperable. An oblique incision was made running from before backward well into the border of the muscles; the two ends were then turned back so they projected posteriorly. They were then sutured, forming a straight line. This method has the advantage of not cutting the muscle across, and gives a very perfect functioning palate.

The only experience he has had with Dr. Sheehan's method was to attempt to use some of the tonsil in a girl of 10 years, for an addition to the soft palate. This effort was unsuccessful, for the tonsil tissue was so soft and friable that it would not hold the sutures. It therefore seems that the method is limited to older patients unless tissue is taken external to the tonsil.

Dr. Vaughan believes that it is very important to close these cases surgically whenever possible; they are very much cleaner. The nasal

mucous membrane becomes healthier as a result of the approach to normal function.

Dr. Vaughan believes that Dr. Sheehan has made a valuable contribution to palate surgery, and expects to profit by some of his suggestions.

Dr. Voislawsky said he had been wondering if in one of these very successful cases that Dr. Sheehan had had, if his patient were to be so unfortunate as to have an attack of acute tonsillitis and if that particular case should fall into the hands of some laryngologist, whether he would not be tempted to remove the tonsils even after they had been superimposed upon the palate. With our modern surgery, whether the operation would not be quite as successful in this position as in the natural location of the tonsil.

Dr. SHEEHAN: I agree with Dr. Ivy that the Brophy method is a very good one. It is interesting to learn from Dr. Dunning the methods used by his Chicago friends. If I use the tonsil where they do not, it is with the object of giving body to the new palate. Probably the tonsils would atrophy, as Dr. Dunning fears, if we were not careful to give them a lining by turning under the membranes as described. It is the muscles, also, that carry the strain of the sutures, not the softer tissues of the tonsils. All this would be useless, however, unless lining was provided for the denuded areas. Without it the contractures would break down the new structure; certainly they would destroy its resilience.

I do not think this is an operation for children, but rather for those adults who, after one or more operations by other methods, have nothing left of the membranes ordinarily used. The three patients I had varied in age from 22 to 30. The field is limited. It is necessary to strike pretty deep into the musculature to get the tissues required for the repair.

Dr. Vaughan's cases were very interesting. I am not a cleft-palate operator, and therefore value the more highly the comments of those who have done much more of this work than I.

Dr. Voislawsky's suggestion about the eagerness to remove tonsils reminds me that when, some years ago, I applied a lining to the pharynx, a physician who was called in to attend the patient later was deceived by the color of the Thiersch graft and wanted to give diphtheria antitoxin. Fortunately this was avoided.

Thirteen Foreign Bodies Removed from an Esophagus at One Sitting. Dr. Sidney Yankauer.

The patient was an insane woman, about 50 years of age, who was trying to commit suicide and swallowed a large number of foreign bodies. The X-ray examination showed these foreign bodies in position, and not only the esophagus but the stomach and intestines were full of the same sort of things, a screw, four hair pins, a nail, a needle, a piece of pottery, a piece of glass, a safety pin, etc. They were all mixed up together, but fortunately the hair pins lay point downward, although the safety pin was pointing upward. The patient had to be put under general anesthesia, for it was not possible to control the woman otherwise. The foreign bodies were removed very readily with the exception of the large piece of pottery found at the bottom; it was very difficult to get hold of it and grasp it. The whole operation would not have occupied over half an hour had it not been for this piece of pottery. As it was, it took two hours. In spite of the two hours of general anesthesia required in removing this collection, and with the nails and screws etc., in her intestines, the woman made a good recovery and asked for food the next day. Since then she has passed the foreign bodies from her intestines and is physically in very good condition.

So far as could be learned, these articles had been in place for about two weeks. The last foreign body swallowed was a screw, which was swallowed within twenty-four hours of taking them out, but the others must have been there for two weeks. The woman was admitted to the insane asylum after coming from the West, and she vomited up a foreign body, and they X-rayed her and found these various objects.

A Canula for the Natural Orifice of the Antrum of Highmore. Dr. Sidney Yankauer.

The puncture of the antrum of Highmore is a very common procedure. And while it is usually perfectly innocuous, not very long ago an article was published in Germany recounting nine deaths following puncture of the antrum. For a long time I have been using a canula for washing out this antrum, and once showed it before the Section, but after this article appeared it interested me to see in just how many cases we could actually pass this canula into the natural orifice, and I found that I could do it in fifty cases out of ninety. I tried all kinds of sizes and shapes of canulae, but finally found that this particular size and shape served in the largest number of cases. By using a somewhat different size and shape, we found that we could get into somewhat more antra, but of the forty cases in which we could not pass the first, we only succeed in four with the others, so that it hardly seemed worth while to go to the extra trouble for so few cases. However, with this particular size and shape it is possible to get into 50 per cent of all antra. The cases in which we tried this were not normal noses, but were noses in which puncture was indicated and antrum disease was suspected. In such cases we have to deal with a different type of nose than the normal ones, for we meet with hypertrophies and deviated septa, and other abnormalities.

Canulization of the natural orifice of the antrum has been done before; Killian devised a canula with half-an-inch of the end bent at right angles, but you could not be sure you were in the orifice with this shape of canula.

The canula which I have constructed is bent at right angles, but has a curve, so that it must be made right and left. This curve fits over the convexity of the lower turbinate. It is introduced along the lower turbinate and rotated until the point is in the middle meatus. When the point is in contact with the outer nasal wall in this region, the tip is moved backwards. The canula will enter the opening whether you start above or below the uncinate process. By keeping up a slight rotary pressure on the instrument you can feel it slip in very distinctly, and once it is in you can move it back and forth according to the size of the natural orifice. When the sensation is once experienced it is not easily forgotten.

This figure of fifty cases out of ninety, making 55 per cent, is rather large, much larger than is given by any text-book. But if we can do anything to diminish the possibility of such accidents as death from the puncture of the antrum, it is well worth while.

JOINT SESSION: SECTIONS OF OTOTOLOGY AND OF LARYNGOLOGY AND RHINOLOGY
ENTERTAINING THE SECTION OF OTO-LARYNGOLOGY OF THE
COLLEGE OF PHYSICIANS, PHILADELPHIA.

April 22, 1925.

Welcome by Dr. D. Bryson Delavan:

Gentlemen of Philadelphia, representatives of the Section on Oto-Laryngology of your fine College of Physicians and Surgeons, our distinguished and very welcome guests: A year ago you extended to us an invitation to come to your city, accept your always gracious hospitality, and spend an evening with you in the interchange of social fellowship and of scientific thought. Your invitation was gladly accepted, the occasion was in every respect successful; the evening full of pleasure and instruction was one long to be remembered. We returned home strongly desirous of reciprocating your kind attentions, and have ever since been planning to extend the hospitalities of New York to you, worthy representatives of the City of Brotherly Love. So, New York,

through the Sections of Laryngology and of Otology of its Academy of Medicine, bids you welcome tonight; New York, the birthplace of laryngology; New York, in which was founded more than fifty years ago the first Society of Laryngology of modern times today in full existence, your present host and entertainer; New York, the home of Horace Green, the father of laryngology, of Gordon Buck, the father of laryngeal surgery of Joseph O'Dwyer, the father of bronchoscopy, of Bosworth, the father of nasal surgery, of Lefferts, the master teacher; New York welcomes you of Philadelphia, that city of advanced learning and culture which has given to the world such brilliant contributors to our specialty as Physick, Harrison Allen, Carl Seiler, and first and last of all J. Solis Cohen, of whom you as well as all of our great country have reason to be proud.

Gentlemen, we appreciate your coming to us; we rejoice in having you; we hope that this may be but the beginning of many more such happy occasions. In the names of those who have gone before us, as well as in our own, we bid you an earnest and hearty welcome.

Demonstration of Artificial Larynx. Dr. John E. MacKenty.

Dr. MacKenty presented a new artificial larynx for use by patients deprived of their larynx by operation or for patients with an obstructed larynx having to wear a tracheal canula. Three patients were presented using the artificial larynx. Three other patients were presented using the stomach or buccal voice. These patients were deprived of their larynges on account of cancer. They acquire speech by filling the esophagus and stomach with air, belching this air into the throat and talking on it. These voices are gutteral but quite distinct in an ordinary sized room.

DISCUSSION.

DR. FIELDING LEWIS said that it was very difficult to discuss something of which one has no knowledge but that certainly Dr. MacKenty was to be congratulated on the great success he was having with this apparatus. He had had the pleasure of seeing Dr. MacKenty demonstrate it a few weeks ago in his office and it seemed a splendid arrangement for these laryngectomized patients. That statement reminded him of the little boy whose teacher in expressing approval of a task said: That is fine. The boy replied: Hell, it's perfect!

As Dr. MacKenty had said, anything that will help these patients to speak will make it possible to save the lives of more of those who suffer from laryngeal cancer, for the first thing such persons ask is: "Will I have a voice after the operation?" Some, of course, have acquired a good buccal voice. Out of fifty-one cases on whom he himself had operated, only three have a buccal voice, two of them distinct enough to be heard over the telephone. In Philadelphia there is a vocal teacher who has had a large experience in teaching persons with defects of speech, together with these patients, and in studying with him how their voice is produced it is hoped that it will be possible to accomplish more for those who have not yet been able to develop a buccal voice. No doubt some will be greatly benefitted, but with others it seems to be of no use, and that is where the artificial larynx will be of great value. As Dr. MacKenty said, many attempts have been made, especially in Europe, to develop such an apparatus, and we should all be proud that an American has been able to develop an artificial larynx which will act so well. Dr. MacKenty is certainly to be congratulated on his achievement.

Maxillary Sinusitis of Oral Origin. Dr. H. S. Dunning.

DISCUSSION.

DR. GEORGE B. WOOD said that it was really worth the trip all the way from Philadelphia to be able to attend a meeting so interesting, so instructive, and accompanied by so much good will and kindly feeling.

Dr. Dunning's paper on the treatment of maxillary sinusitis was exceedingly interesting and most instructive. On the whole, he was in accord with all that Dr. Dunning had said, although he had not had as

large an experience in the closure of ayeolar fistulae as Dr. Dunning has had. Judging from his own experience, Dr. Wood believed that the majority of the cases of maxillary sinusitis, both acute and chronic, originate from nasal infections, and also that the involvement of the ethmoids so frequently seen in these cases is secondary and not primary.

In years gone by, in those cases of chronic maxillary sinusitis which were dental in origin, he had sometimes followed the suggestion of Dr. Freeman, Philadelphia, and treated them by an ayeolar opening made through the socket where the tooth had been extracted and kept open by a dental plug made of hard rubber. Though some of these cases finally got well, he considered this method of treatment greatly inferior to the intranasal work, and has entirely abandoned it.

Dr. Wood agreed absolutely with Dr. Dunning that dental men should not undertake the treatment of maxillary suppuration. These cases belong in the domain of the rhinologist. However, he felt that the diagnosis of the condition of the teeth, whether they were vital or non-vital, did belong to the dentist and he should have the final say as to the advisability of extraction. The orthodontist should never, even when the extraction of the tooth opens up the floor of the maxillary sinus, make an attempt to treat the sinus through the opening or through an enlarged one. He had found that when the opening through the ayeolus into the antrum was large, the use of a hard small rubber plate, as suggested by Dr. Dunning, was very satisfactory.

In the large majority of cases, the radical operation, in Dr. Wood's opinion, should only be done after intranasal surgery has failed to cure. Also, when a radical operation, such as the Caldwell-Luc, is undertaken it should be a hospital operation, though the simple opening through the inferior meatus can be done in one's office if he is equipped to do surgical work. When the radical operation is done, Dr. Wood believed that the removal of the mucous membrane from the antral cavity is seldom called for. It has been his practice to traumatise the mucous membrane as little as possible, except where there is actual caries of the bone, and the cases apparently heal up just as promptly as though they had been thoroughly curetted.

DR. DUNNING, in closing the discussion, said that the cases to which he had referred were chronic cases, the ones that do not clear up but keep on suppurating, and by finding out whether the teeth are infected, etc., he could do as he had stated. Finding out whether the teeth are infected, however, is sometimes difficult. Often when a tooth is extracted the extractor takes out the tooth but leaves the process there, and between the dentist and the rhinologist the patient still suffers from the process. There is infected membrane and tissue.

The Caldwell-Luc operation should be done only in bad cases. Working in the office with local anesthesia the patient is co-operating with you; there is very little shock for the patient if he is properly prepared, and there is much less trouble under local than under general anesthesia. After the operation the antrum through the base is packed tight so that there is little danger of secondary hemorrhage, and the patient is sent home in very good condition. As a rule the hemorrhage is not great, for the antrum is packed with Iodoform gauze.

Paper: **The Clinical Significance and Diagnostic Value of Tuning Fork Tests for Hearing.** Dr. Arthur B. Duel.

Paper: **The Clinical Value and Diagnostic Significance of the Newer Tests for Hearing.** Dr. Edmund Prince Fowler.

DISCUSSION.

DR. B. ALEX. RANDALL said the matter of tuning fork tests greatly interests me; and I speak as a firm believer in such tests, with considerable skepticism as to the newer methods of audiometer, etc. There is much room for question as to what tones are actually employed in these newer tests, for we are well aware that marked transposing of tone takes place in such apparatus; as the telephone transmitter, al-

though conveying much of the individuality of a speaker's voice or other tones, presents to the listener a deep basso as an elfin treble. It thus affords in most instances none of the magnification claimed, but merely adapts deep tones to an ear capable of hearing the high only. The microphone was long since shown to be of little aid to the deaf as regards conversational tones; but the modern audion seems a true magnifier of sound waves and a means of studying and hence recording, perhaps only in paraphrase the quantitative audition. I regret not having brought my diagrams of the tuning fork tests; for they can make at least as clear cut and convincing a showing as those for the audiometer. Like Dr. Duell, I believe in the great diagnostic usefulness of the forks to the practicing aurist; for a few simple tests can in minimum time give the needed data for diagnosis and prognosis.

Not all the forks of the shops are what they claim to be; but on the kymographion the exact vibration rate is easily read for each, while its note can be purified of overtones. Its energy of vibration is approximately standardized if it is allowed to fall of its own weight through its own height to strike upon the muscle cushion above the knee. One hundred such trials will vary hardly 10 per cent in its duration of audibility. A low, a medium and a high-pitched fork suffice for most needs; and I find an A of about 200 d.v.s., with a duration of 70-100 seconds, the most convenient for most tests. Held before the meatus with its tines pointed at the ear (the position of maximum audible and minimum palpable vibrations), it should be heard at some 40 c.m. or for 100 seconds as it is gradually approached to the ear; while with its handle resting on its own weight upon the mastoid it should be heard about half so long.

Resting the handle of the vibrating fork upon any part of the mid-line of the head, it can furnish a generally reliable Weber test of lateralization of the bone conduction, especially if in the Roosa-Rinne test at the ear the patient has been brought to realize that it can be heard through bone in an ear claimed to have long been totally deaf. But if rested on the bridge of the nose (Gardiner-Brown) this becomes an admirable quantitative measure, as we note by how many seconds longer or shorter time it is heard than it is felt by the examiner's fingers. The normal duration for the fork employed, +— this figure, gives in a moment the true Swabach test of bone conduction for that fork. The simple Roosa-Rinne test of "louder front or back" is very brief, yet reliable; just as Pierce's plan of thrusting the handle occludingly into the canal makes the same tuning fork one of our best "noise apparatus" for excluding that ear from hearing the voice and can thus unmask most malingerers. The too-little-used test of Politzer as to whether the vibrations of the fork held before the nostrils are heard louder or not in swallowing, tells as to active patency of the Eustachian tubes in most valuable fashion, without any inflation and its prerequisite cleansing of nose and tube mouth; and the neurologist is borrowing our tuning fork to test the deep sensibility of muscle and other structures.

Thus a simple, inexpensive and easily portable tuning fork in the Roosa-Rinne, Gardiner-Brown, Weber and Politzer tests can at the bedside or office in a minute or two give us most of the needed data for our diagnostic localization and measurement of deafness.

DR. CURTIS EVERETT said that few men have had the opportunity to do experimental research work that Dr. Fowler and others enjoy. He knew very little about this work and could only express his appreciation of the work these men are doing with the hope that something valuable will come from it.

Few otologists know enough to discuss it intelligently at the present time. The main point in all the newer experimental work is that some time-saving, reliable tests of the hearing will be found which will point out the conditions existing.

It would seem that something of real value is about to come from this experimental work.

DR. DUEL said that he held no brief against the newer method of examining ears and was watching with much interest the progress that was being made. In regard to the question of the accuracy of the fork tests as compared with that of the newer methods, one could only say that there was opportunity for improvement in both cases. His own experience with the audiometer had taught him that it was very possible to make many mistakes; for instance, he had asked an expert to make two tests of his own hearing by the method just described and had tried to be as fair as possible in his answers. What he had done, however, which the operator was not aware of, was to press the receiver of the apparatus lightly against the ear in the first instance and in the next to press it a little more tightly. The tests were made by an enthusiast, but the slight difference in pressure made a great difference in the result. When the produced tones reach the upper register, say above 512, very frequently on close pressure of the receiver against the ear they will not be heard, while if the receiver is slightly removed they will be readily perceived. It is obvious, therefore, that some method of standardized pressure must be devised in order to prevent egregious errors.

Dr. Duel reiterated, however, that he did not wish to appear hypercritical of the newer methods of testing, but that having used the tuning forks for more than twenty years the concepts of hearing which he had been able to obtain had been eminently satisfactory both as to diagnosis and prognosis, and if today he was obliged to choose between having, say, five tuning forks, or all the newer apparatus, he would choose the tuning forks, because with the latter he could not get as clear a concept of the patient's condition.

DR. E. P. FOWLER, in closing the discussion, again agreed with what Dr. Duel had said. All of these details have to be watched. The objection in regard to uneven pressure was overcome by using a spring. He had himself always used the same spring apparatus, and had had no trouble in that respect. There was always trouble with the higher tones, and he was not satisfied with the results from them.

As for the tuning forks, in his opinion we often fool ourselves as to what we are getting. Recently he had made some hundreds of tests with tuning forks, and found that even trained observers will get very different results; therefore, one or two observations with tuning forks are not accurate. If you are going to use the Rinne test, this is the difference between A and B conduction; that is one thing. It is a very valuable test, and the Weber test is valuable, and tricky, too. If you use a tuning fork as the test and tell the person to close the ear, he will lateralize the sound to the closed ear, if he presses gently. If he presses too hard with his finger the sound will lateralize to the opposite ear. Tuning forks will play as many tricks as the audiometer. The trouble is one is not always on the lookout with these instruments. The right way was to do as Dr. Duel said, take the good, and try to improve all the time. Unless these experiments are encouraged we will not learn much about our testings; and we won't know what little means. We are doing it according to the book, but it seems doubtful whether a diagnosis founded thereon is true or not.

A Method of Barrage Anesthesia for Mastoidectomy. Dr. Isidor Friesner.

Dr. Friesner said that this was not a new method of anesthesia, but was the well known method used by the neurological surgeons applied to otological surgery, and was first introduced to him three or four years ago while assisting a general surgeon, Dr. William Kline, of New York, in operating on a child who could not take a general anesthetic. Before that he had seen a number of attempts at local anesthesia for mastoidectomy, with a little local anesthesia and much vocal anesthesia, and he was astonished at the facility with which the operation could be performed after the introduction of the local anesthesia in the manner about to be described. He had since used it a number of times with almost invariable success. The one important difference between this method and the ones heretofore employed is that no attempt is

made to infiltrate either the periosteum or subperiosteally. The fact that the nerves supplying the periosteum come into the latter through the soft parts is the basis of the procedure. Four points are selected: one above, over the temporal muscle; one behind; one immediately in front of the tragus; and one below the tip. A little ethyl chlorid is sprayed first, and then by means of the hypodermic syringe $\frac{1}{2}$ per cent of novocain is injected here and makes a small wheal; a second and a third injection are made here and here; then these are joined so that we have laid down a barrage of anesthesia. The final point is that the needle is introduced at the juncture of the upper third and middle third of the canal wall, and this area is infiltrated with 1 per cent novocain. No attempt is made to infiltrate directly into the area where the wound is made.

DR. GEORGE M. COATS said that when he was first asked to discuss this method he did not know what was meant by the term "barrage" nor did any of his colleagues either in Philadelphia or anyone whom he had seen since he reached New York, but in a general way he had worked out by analogy about what it must mean. During the war local anesthesia was used for many operations which had before been done only under general anesthesia. Of course, the infiltration method was the one always used for mastoidectomy and it had been most successful, but he had been much interested in this method described by Dr. Friesner and would certainly try it. In any method it does not seem necessary to carry the anesthetic solution below the periosteum. One advantage in local anesthesia is that there is less hemorrhage and it would be interesting to know whether this barrage method will give the same amount of hemostasis. Of course the adrenalin and novocain do cut down the hemorrhage and give a comparatively bloodless field. There is doubt that local anesthesia for mastoidectomy is a very useful procedure, especially in those cases where general anesthesia is more or less contra-indicated. In cases of diabetics, a local anesthesia mastoidectomy will save many patients, and it is indicated in nephritis, heart and pneumonia cases, etc.

One point in connection with local anesthesia by the infiltration method would probably apply to the barrage method also. Dr. Coates then told of how a few weeks ago an assistant was operating on a case of sinus thrombosis and in working near the tip had asked him to watch the face. While doing this he remarked that the "facial has gone." About twenty minutes later, however, the nerve was functioning again. The function had been completely interfered with for a short time, which was undoubtedly due to the deep injection below the tip of the mastoid. Age is no contra-indication—the youngest patient thus operated upon being fourteen.

DR. FRIESNER, replying to Dr. Coates, said that after the anesthesia is applied in the way described and before starting the operation, the tip is more thoroughly infiltrated. The first time this was presented to him, adrenalin was used, but he did not think it was necessary. The amount of bleeding from the flaps was so insignificant that it was not worth while to control it. As for the vascular bleeding, the vessels had to be clamped. He had thought it would be painful to clamp the vessels, but found that clamps could be applied to the edge of the wound without causing pain. One should be careful in infiltrating the tip, and not go too deep. He had not found it necessary, even when stripping the aponeurotic fibres or cutting that it made very much difference even where quite a little force was required, to detach the fibres. The anesthesia was perfect and he had yet to see a case of facial paralysis.

DR. FIELDING LEWIS: Ladies and Gentlemen: As Chairman of the Visiting Section I wish to express to the Oto-Laryngological and Rhinological Sections of the Academy our sincere appreciation of your generous hospitality and also of this very splendid and instructive evening. It seems to me that this spirit of comradeship between the otolaryngologists of these two great cities is a step in the right direction. We become better acquainted, and the meetings are very instructive. I hope that next year in return you will be our guests.

THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

REGULAR MEETING, CADAWALDER HALL, COLLEGE OF PHYSICIANS.

Tuesday, January 6, 1925.

The Problem of Focal Infections in the Nasal Sinuses. Dr. E. Ross Faulkner.

DISCUSSION.

DR. ROSS HALL SKILLEEN: Anyone who has familiarized himself with the subject must have remarked on the number of papers appearing in the past two years on focal infections from the cavities of the head. As far as the sinuses were concerned most of my cases resulted from some condition of the ethmoids, and these cases were rarely hidden varieties of infection. It need not be in all the cells of the ethmoid; it may indeed be in a single cell. I do not know of anything more difficult than to find one of these obscure ethmoid cells which is causing the condition. A very small infection and with very little pus may cause serious things as endocarditis, interstitial nephritis, etc. I am not prepared to give statistics in regard to ethmoids, but roughly speaking would think infection from them constitute about 80 per cent.

Take five cases, if you will, traced to sinuses. Four out of these cases will have their origin in the ethmoids, very rarely in the frontals. The ethmoid infection undoubtedly travels into the system by vascular system. The infection from the sphenoid travels into the throat and then into the stomach through the alimentary canal.

Dr. Faulkner has covered so much of this material. He spoke of antiseptics. I fully agree with him. I have never been able yet by washing out the cavities with these to accomplish any more than I would with ordinary warm saline solution.

I am deeply sensible to the possibilities of this subject and feel it is going to be a very important one in the next few years.

DR. JUDSON C. DALAND: The study of the relationship of the toxins to the micro-organisms in systemic infections secondary to focal infection is of great practical value. I am quite certain that in many cases the toxins produced by the micro-organism are the chief factors in causing disease elsewhere. It is not unusual to observe systemic infection from infective sinusitis continuing for months or years, and in one case of chronic periapical dental infection, I ascertained that the infection had existed for twenty-two years.

It is important to remember that a very small amount of infective tissue in the sinuses, especially if shut off from access to the air, is capable of producing serious secondary consequences.

I am quite certain that occasionally a chronic infective ethmoiditis exists, and at the same time there is infection of the ethmoidal cells shut off from communication with the cavity lined by an infective membrane or polypoid growths, and that this small shut-off area of infection, which may be purulent or may at times be infective without the presence of pus, is the essential cause of the persistence of the secondary manifestations of infective ethmoiditis.

So far as my clinical experience is concerned, I find that the ethmoid is the most common seat of infection, though not infrequently the sphenoid is involved, separately or in conjunction with the ethmoid. Although maxillary sinusitis is common, it has not produced systemic infections very frequently as compared with ethmoidal sinusitis.

My experience coincides with that of Dr. Faulkner, who states that the otolaryngologist should not make a diagnosis until he has made

multiple examinations. The absence of pus does not absent infective sinusitis. The presence of pus makes the diagnosis.

Occasionally sinusitis occurs due to *streptococcus hemolyticus* or *viridans*, which, when shut off from the air, may exist without the presence of pus, precisely as it does around and about a periapical dental infection. This condition is perhaps more common than we believe, and can only be diagnosed by an acute observer.

Vaccines are usually of little or no value if a focus of infection is unremoved, but are of very great value when all infection has been removed, more especially in the aged and debilitated.

It is all-important that the vaccine should be made promptly, from fresh material, so that the strain of the organism is the same as the one from which the patient is suffering. It is also equally important that the dose should be accurately graduated to the requirements of the patient, and increased gradually at five-day intervals, so as to build up immune bodies and avoid a systemic reaction.

Occasionally, when the vaccine is given to a patient from whom all foci of infection have not been removed, I have observed a marked reaction from a small dose.

In conclusion, may I urge that the oto-laryngologist give a special study to the diagnosis of infective sinusitis, so that by new information thus secured, we shall be able to more quickly diagnose and remove infective sinusitis.

DR. M. S. ERSNER: An erroneous impression which is very prevalent is that the antra are not important foci of infection. I repeatedly noticed, however, than an acute follicular tonsillitis will follow an antrum puncture, especially when the antra infection is of a chronic nature. Recently a chronic maxillary antra was punctured and within twenty-four hours, an acute follicular tonsillitis developed with a temperature of 104° and within seventy-two hours there was a frank polyarticular rheumatism. This patient was ill for several months with polyarthritis and endocarditis.

In suppurative ethmoiditis, I find that hot silvol in the form of tampons is a most useful therapeutic agent. My attention was drawn to this drug by my friend and teacher, Dr. Ross H. Skillern, and I feel very grateful to him for this suggestion, as my patients improve very rapidly with this treatment.

Specific and nonspecific proteins are a great asset in chronic suppurative conditions. I generally administer diphtheria antitoxin to patients who have been operated upon for mastoidectomy and whose wounds do not heal as rapidly as they should. At the end of the mastoid season, we usually have about six or eight "hangers on" whose wounds do not heal, and it is surprising that within a short time these wounds clear up after 5 or 10,000 units of antitoxin has been administered.

In several instances a diphtheroid organism has been isolated from the mastoid wound but we at no time did the guinea pig test and are therefore unable to state definitely whether this was a true diphtheria organism or the psuedo-diphtheria, which is a contaminator. It will be interesting to note whether the concentrated diphtheria antitoxin will have the same effect as the old antitoxin.

DR. G. M. COATES: I was interested greatly in what Dr. Faulkner had to say about the value of vaccines in sinus diseases. In my experience, vaccines have been a help under certain conditions. There is but little use in administering vaccines in a chronic sinus condition until thorough drainage has been established. Now in such a case as that, we will note that even after drainage has been established it often takes a longer time to secure a dry sinus. In these cases, vaccines, I believe, help secure the local result and also help to control the results of the focal infection, arthritis or whatever they may be. Is it always necessary to use an autogenous vaccine containing the specific organism?

This, I think, we do not know, as a good deal of immunological work reported recently has been along the lines of nonspecific protein therapy, even going as far as milk injections in place of bacterial suspensions.

I want to call your attention to the fact that the ophthalmologists are apparently obtaining results in their infected eye cases by the use of diphtheria antitoxin which, of course, is nonspecific for these cases. It is often hard to find the focus of infection in our arthritis cases. The teeth, the tonsils and the sinuses are the most to be suspected in that order. While no time should be lost, it is usually possible to have the teeth X-rayed at the same time that the sinus X-rays are taken. Of course, the tonsils are always suspicious.

I have been interested in watching a good many cases of asthma in recent years and attempting to find foci of infection in them. In quite a large percentage of such cases, we find some infection either in the teeth, tonsils or sinuses. Quite a large proportion is discovered in the latter. Furthermore eradication of such a focus, even if it is a small one, not infrequently causes great relief.

Another aspect of focal infection that Dr. Faulkner did not speak of is progressive deafness. As you know, Emerson, of Boston, has laid down the law that practically all cases of progressive deafness are due to foci of infection and frequently date back to childhood. Of course, in these cases the tonsils are the most common offenders, but as shown long ago by Coffin, Dean, Armstrong, Skillern and others it is not uncommon to have an acute and chronic suppuration in the sinuses in young children and that even in infants there may be precocious sinus development and consequent infection.

I have enjoyed Dr. Faulkner's paper very much and feel that he has given us a great deal to think about.

DR. FAULKNER (closing): I agree with Dr. Skillern that the ethmoids are most prone to become infected and second to them are the sphenoids.

Although only small foci may be noticed in the teeth they, however, occupy an important place in focal infection. I also agree with Dr. Daland in regard to vaccines, especially when administered properly. I was skeptical for a long time as to the true value of vaccine but I have since learned that they occupy an important place when properly employed.

I have been very much pleased with the kind reception given me this evening by this Society. Thank you!

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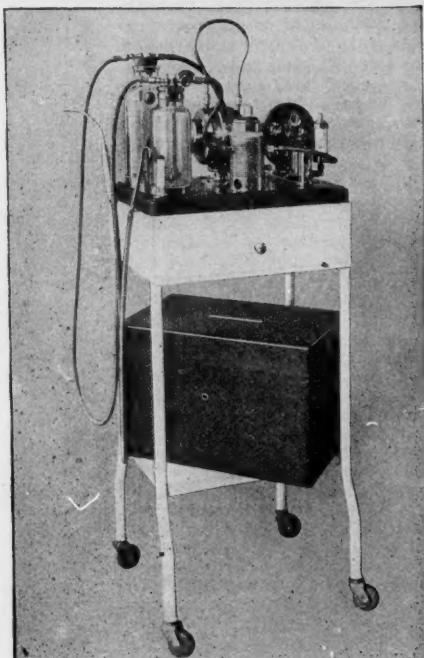
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